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SAN FRANCISCO TRANSPORTATION PLAN 2040

FINAL REPORT

DECEMBER 2013

SAN FRANCISCO COUNTY TRANSPORTATION AUTHORITY

FROM THE EXECUTIVE DIRECTOR

The countywide transportation plan is where all of the city's transportation modes, operators, and networks come together. Ten years ago we developed the first long-range transportation plan and investment blueprint for San Francisco. This investment strategy served as the basis for Prop K, the half-cent transportation sales tax reauthorized by over 75% of voters in late 2003. To date, we have allocated over $1 billion in Prop K expenditures, leveraging as we did so significant regional, state, and federal matching dollars. The Transportation Authority's Prop K and other allocations have funded critical improvements in every neighborhood such as traffic calming, safe pedestrian and bicycle networks, new transit vehicles, signal priority, and street resurfacing. With the help of public and private partners, all of the Plan's signature capital investments also have been implemented or are substantially underway, including the Presidio Parkway, Transbay Transit Center, Central Subway, and Van Ness Avenue Bus Rapid Transit. During this time, the city responded together with the region to a statewide call to action on climate change, approving a generation of land use plans with transit-oriented designs and sustainable policies. Together, we weathered an economic cycle whose impacts were mitigated by our ability to use local funds such as Prop K to keep projects moving forward and competitive for new funding opportunities when they eventually arose (such as federal stimulus funds). We also partnered with the City to maintain our transportation assets, though significant needs remain. Now, as economic activity returns, we must continue to invest to address pressing maintenance and safety needs. We should deploy and manage our scarce resources efficiently. And we will develop innovative solutions and deliver the next generation of infrastructure that is necessary to meet our goals for a healthy, vibrant, and equitable transportation system for all users.

Tilly Chang

EXECUTIVE DIRECTOR, SFCTA

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Adopted by the Transportation Authority Board on December 17, 2013

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Photo above courtesy of Perkins + Will | Report design by Bridget Smith

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CHAPTER ONE

INTRODUCING THE SAN FRANCISCO TRANSPORTATION PLAN

THE SAN FRANCISCO TRANSPORTATION PLAN, OR SFTP, is the blueprint for San Francisco's transportation system development and investment over the next 30 years. The SFTP brings all transportation modes, operators, and networks together, with a view to improving travel choices for all users. Through detailed analysis, interagency collaboration, and listening to the public, we've evaluated ways to improve our system with existing and potential new revenues. The SFTP recommends a diverse investment plan that makes meaningful progress towards our important goals: livability, world-class infrastructure, economic competitiveness, and a healthy environment. The SFTP also recommends policy changes that depart from business as usual and will help us make the most of our investments.

INSIDE THE SFTP

The SFTP contains:

- The Investment Plan, to guide spending of existing and anticipated new transportation funds through 2040.
- The SF Investment Vision, to guide spending of additional new locally-controlled revenues.
- Policy recommendations and strategic initiatives to complement the Investment Plan and Vision.
- Next steps for implementing the SFTP recommendations and monitoring results.

Through 2040, we can expect about $75 billion in funding to support San Francisco's transportation system. Most of this is already committed to specific projects or purposes. This leaves $5 billion in existing and anticipated new revenues that we can decide how to spend. As shown in Figure 1, this $75 billion funds the Investment Plan. Because there is far more need than available revenues for transportation, the SF Investment Vision assumes an additional $7.5 billion in locally-controlled revenues. Figure 2 presents the highlights of the Investment Plan and Vision.

PHOTO: CENTRAL SUBWAY'S TUNNEL BORING MACHINE "MOM CHUNG" IS NOW MAKING ITS WAY BENEATH THE STREETS OF SAN FRANCISCO

FIGURE 1. SF INVESTMENT PLAN AND SF INVESTMENT VISION REVENUE
(BY USE)

FIGURE 2. HIGHLIGHTS OF THE SFTP INVESTMENT SCENARIOS

	INVESTMENT PLAN		SF INVESTMENT VISION	
Operations and Maintenance of Transit and Streets	$66.3B 88%	70% of highest priority transit maintenance needs met Maintains today's pavement condition	$69.7B 84%	100 % of highest priority transit maintenance needs met Pavement condition improves to "good" levels
Multimodal Street Safety, Enhancement, and Community Mobility	$1.2B 1%	About 40% of the City's Pedestrian Safety Strategy and 22% of the City's Bicycle Strategy funded Parking and peak period congestion pricing downtown help reduce auto trips by up to 10%	$2.5B 3%	100% of the Pedestrian Safety and Bicycle Strategies funded Further expansions of cost-effective employer, school, and community trip reduction programs help reduce auto trips by up to 14%
Efficiency and Expansion Projects	$7.6B 10%	15 miles of protected transit lanes Caltrain electrification and extension to a rebuilt Transbay Terminal	$10.4B 13%	Up to 33 miles of protected transit lanes, including increased BART capacity and reliability Freeway management and transit efficiency strategies, including increased BART capacity and reliability
TOTAL	**$75.1B**		**$82.6B**	

The SFTP recommends a diverse investment plan that makes meaningful progress towards our important goals: safe and livable neighborhoods, well-maintained infrastructure, economic competitiveness, and environmental health.

KEY FINDINGS AND POLICY RECOMMENDATIONS

- Prioritize revenues to fully fund timely vehicle replacement and rehabilitation
- Expand transit service while supporting steps to stabilize costs
- Achieve city goals for average pavement condition
- Build the pedestrian and bicycle strategies to establish safer neighborhood networks citywide
- Create more complete streets (at lower cost) through coordination with repaving
- Increase investment in employer, school, and community trip reduction programs
- Increase transparency and promote public involvement by sharing agency prioritization and development processes
- Continue to develop pricing approaches to congestion management
- Continue rapid transit network development, including bus rapid transit
- Continue to coordinate transit investment with land use development plans
- Set a vision for managing the city's freeway network
- Identify the next generation transit network priorities for BART, Caltrain, and Muni
- Consider all options for delivering projects

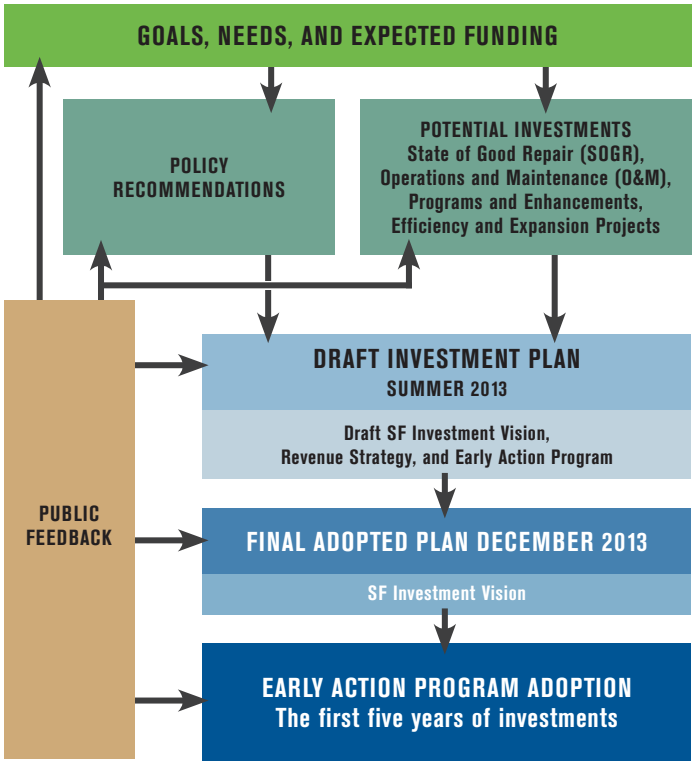
GOALS, NEEDS, AND EXPECTED FUNDING
POLICY RECOMMENDATIONS
POTENTIAL INVESTMENTS
State of Good Repair (SOGR), Operations and Maintenance (O&M), Programs and Enhancements, Efficiency and Expansion Projects
PUBLIC FEEDBACK
DRAFT INVESTMENT PLAN
SUMMER 2013
Draft SF Investment Vision, Revenue Strategy, and Early Action Program
FINAL ADOPTED PLAN DECEMBER 2013
SF Investment Vision
EARLY ACTION PROGRAM ADOPTION
The first five years of investments

FIGURE 3. SFTP PROCESS FLOW CHART

SFTP GOALS

The SFTP positions San Francisco to meet our city's transportation system goals. We identified the four SFTP goal areas, shown in Figure 4, through Board, partner agency, and community input, and through consideration of city policies like the Transit First Policy in the City Charter and the City's Climate Action Plan. Appendix A (SFTP Plan Development Process) and Appendix B (Needs Analysis White Paper) describe how these goals and associated performance measures shaped our assessment of transportation system needs, the Investment Plans, and policy recommendations.

HOW WE DEVELOPED THE SFTP

As Congestion Management Agency (CMA) for San Francisco, the Transportation Authority is responsible for developing a long-range, countywide transportation plan. We developed the SFTP through extensive technical analysis, consultation with partner agencies, and community outreach over several years. Appendices A-J describe the technical analysis behind the plan.

Throughout the SFTP development process, we heard several consistent policy questions from our Board, partner agencies, and the public, and we responded with research and analysis. Figure 5 (next page) lists the policy research topics and associated products. The research findings led to the creation of the final policy recommendations contained in this document.

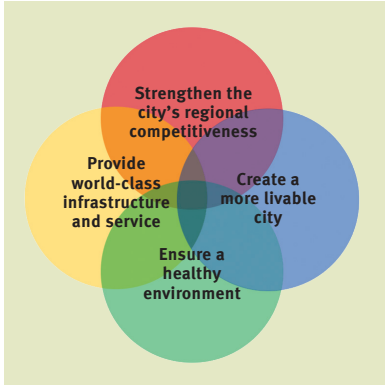
Strengthen the city's regional competitiveness
Provide world-class infrastructure and service
Create a more livable city
Ensure a healthy environment

FIGURE 4. SFTP GOAL AREAS

THE SIGNIFICANCE OF THE SFTP

The priorities established in the SFTP influence the regional transportation plan prepared by the Metropolitan Transportation Commission (MTC), known as Plan Bay Area, and position San Francisco for regional, state, and federal transportation funding. Transportation projects seeking this funding must be consistent with the SFTP and Plan Bay Area.

Additionally, the SFTP informs and guides other local and regional plans and policy priorities:

- It reflects and reinforces San Francisco's Transit First Policy, adopted in 1973.
- It informs local plans and investments including the General Plan Transportation Element, the SFMTA and City and County of San Francisco Capital Plans, and regional transit operator (e.g. BART and Caltrain) expansion plans.
- It informs San Francisco's efforts to manage congestion and coordinate transportation investment with land use, as described in the Congestion Management Program (CMP).
- It guides project selection for the Proposition K (Prop K) 5-year plans. Prop K is San Francisco's half-cent transportation sales tax, approved by over 75% of voters in 2003. Prop K leverages federal, state, and other funds to direct hundreds of millions of dollars toward SFTP implementation.

Significant progress has been made on goals set in the 2004 Countywide Transportation Plan, projects that were made possible in part through San Francisco's Prop K transportation sales tax dollars, approved by over 75% of voters in 2003.

FIGURE 5. ANALYSIS AND POLICY STUDIES DEVELOPED DURING THE SFTP PROCESS

POLICY QUESTION/STRATEGIC INITIATIVE	RESEARCH PRODUCT
How can we...	
Meet our ambitious livability and environmental goals?	Needs Analysis White Paper (Appendix B)
Improve the social and geographic equity of our transportation system?	Transportation Equity Analysis (Appendix F)
Create complete streets that improve safety for all users?	Small Project Delivery White Paper (Appendix H)
Deliver transportation projects faster?	Small Project Delivery White Paper (Appendix H) Large Project Delivery White Paper (Appendix I)
Reduce conflicts between the local and regional transportation systems, and improve connections?	Core Circulation Study (Appendix C)
Collaborate more effectively with the private sector to manage travel demand?	Travel demand management strategic plan (expected spring 2014)
Reduce conflicts and provide for the needs generated by the fast-growing SoMa neighborhood?	Core Circulation Study (Appendix C)
Raise new revenue for transportation?	Revenue Options Analysis (available on request) Revenue White Paper (expected early 2014)
Meet the unique transportation needs of young students, visitors, and deliveries?	Needs Analysis White Paper (Appendix B)

ACCOMPLISHMENTS SINCE THE LAST PLAN

The SFTP builds on the accomplishments of the 2004 Countywide Transportation Plan,[1] including:

- Major investments in new transit capacity and system maintenance projects are constructed or underway:
  - » T-Third Light Rail linking the Bayview and South of Market.
  - » Tunneling work for the new Central Subway linking the T-Third to SoMa, Union Square and Chinatown.
  - » Replacement of the old Central Freeway with Octavia Boulevard.
  - » Replacement of Doyle Drive with Presidio Parkway.
  - » A new Transbay Transit Center under construction.
- A citywide network of rapid buses is under development:
  - » Completion of environmental work for Van Ness Avenue Bus Rapid Transit (BRT).
  - » Environmental impact analyses are underway for Geary Boulevard BRT and the Transit Effectiveness Project.
- Neighborhoods are more livable, through bicycle, pedestrian, traffic calming, and streetscape improvements:
  - » Prop K provided the first and only stable source of funding for traffic calming.
  - » Examples such as Leland Avenue, Valencia Street, and Broadway Street re-designs demonstrate new ways of improving safety, livability, and creating open space.
  - » Majority of SF Bicycle Plan constructed.
- Parking management and road pricing are key concepts in discussions about managing San Francisco's transportation system:

1 The 2004 Plan is available on the authority web site: http://www.sfcta.org/documents-and-data/documents/2004-countywide-transportation-plan

  - » SFMTA piloted variable parking pricing and management (SFpark).
  - » The Transportation Authority Board adopted the Mobility Access and Pricing Study exploring various scenarios for possible congestion charge downtown.
  - » The Board of Supervisors unanimously adopted the innovative road and parking pricing program for Treasure Island.
- Multiple Neighborhood Transportation Plans adopted by the Authority Board have established a pipeline of community-supported neighborhood transportation projects, many of which have been implemented, including in the Outer Mission, Mission South of Chavez, Tenderloin/Little Saigon, Bayview, Western South of Market, and Balboa Park.
- Numerous state of good repair investments to improve the reliability of the transportation network:
  - » Construction of the Muni Metro East Maintenance Facility, the first major expansion to the SFMTA's Light Rail Vehicle maintenance facilities since the 1970s.
  - » Acquisition of nearly 200 new hybrid buses for Muni and the construction of the Islais Creek Maintenance Facility, the first new rubber-tire maintenance facility in 60 years.
  - » Street resurfacing, traffic signal upgrades, sidewalk repairs, and new curb ramps on sidewalks citywide.

Top to bottom: Projects as diverse as the Central Subway, new bicycle facilities, the T-Third light rail line, and Western SoMa streetscape enhancements are all part of the legacy of the 2004 Countywide Transportation Plan.

THE SAN FRANCISCO COUNTY TRANSPORTATION AUTHORITY

Created in 1989, the Transportation Authority:

- Develops San Francisco's long-range transportation plan (SFTP)
- Helps analyze and fund transportation system improvements
- Administers the Prop K half-cent local transportation sales tax program and the Prop AA vehicle license fee.
- Manages the Transportation Fund for Clean Air (TFCA).
- Serves as Congestion Management Agency (CMA) for San Francisco under state law. Prop 111, passed in 1990, increased the state fuel tax and required urban counties to designate a CMA responsible for coordinating transportation planning, funding and other activities in a congestion management program. To learn more about the Transportation Authority, visit our web site at www.sfcta.org.

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CHAPTER TWO

OUR TRANSPORTATION CHALLENGES AND OPPORTUNITIES

SEVERAL CRITICAL CHALLENGES AND OPPORTUNITIES must be considered as we strive to achieve our transportation system goals for livability, world-class infrastructure, economic competitiveness, and a healthy environment. The following section highlights these issues, and Appendix B provides additional detail. Appendix K (San Francisco Travel at a Glance) depicts three key travel trends that shaped the SFTP.

LIVABILITY

San Francisco aims to be a livable city—one where walking, bicycling, and transit are safe, comfortable, and convenient modes of travel. Accordingly,

- The SFMTA has set a goal of more than 50% of trips by walking, bicycling, and transit by 2018.
- The Mayor's Executive Directive 10-03 called for a 50% reduction in severe and fatal pedestrian injuries by 2021.
- The Board of Supervisors set a goal of achieving a 20% bicycle mode share by 2020.

Achieving the desired growth in bicycling, walking, and transit trips while reducing the rate of injuries and fatalities will require increased investment, education, and re-allocation of street space—sometimes with difficult trade-offs—to these modes.

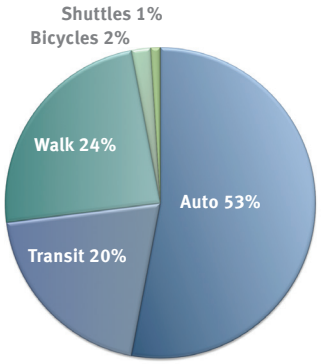
We asked "what would it take?" to achieve San Francisco's ambitious goals. Some of our goals, such as world-class infrastructure would require major increases in funding. Others require both new funding and bold policies that prioritize transit, walking, and bicycling in our limited rights of way. See page 19 for a summary.

MANY WANT TO WALK AND BIKE TODAY, BUT DON'T DUE TO SAFETY CONCERNS

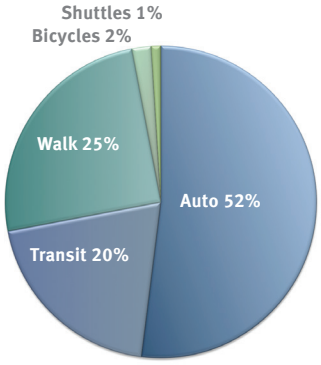
Supporting travel by walking and bicycling requires safety improvements. Safety concerns discourage pedestrians: about 820 pedestrians are killed or injured every year in San Francisco, many on arterials roadways identified in the Walkfirst Investment Plan (Figure 6). Without

FIGURE 7. SHARE OF TRIPS BY MODE OF TRAVEL, 2013 (TOP) AND 2040 BUSINESS AS USUAL (BOTTOM)

2013



2040, BUSINESS AS USUAL



SOURCE: SFCTA, SF CHAMP

significant new investment, this number could grow as high as 980[1] by 2040 due to projected increases in automobile trips.

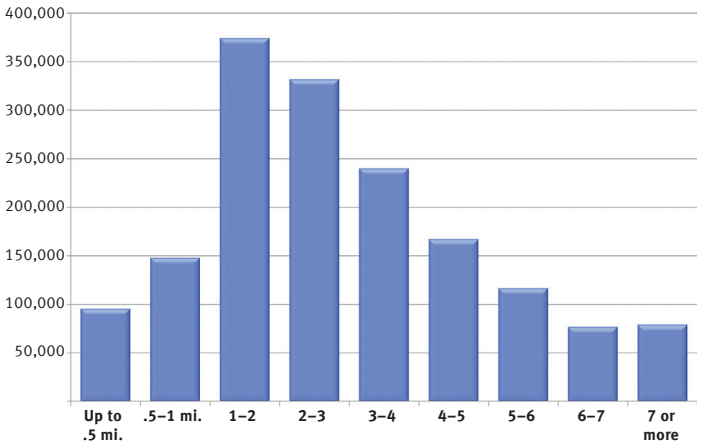
San Francisco's aging population also adds to the challenge of achieving this goal. San Francisco is projected to experience 68% growth in number of people 65 and older by 2040, making this group 20% of the population (compared to 16% today[2]). Older pedestrians are more vulnerable to serious injury or death when struck by an automobile.

Safety concerns also discourage bicycling. Surveys conducted for the SFMTA's 2012 State of Cycling Report indicate that almost half of those who do not currently bicycle say they are uncomfortable bicycling in mixed flow traffic with cars, and only 13% said they feel safe from traffic when bicycling. At the same time, 94% of respondents said they would feel comfortable riding in bicycle lanes.

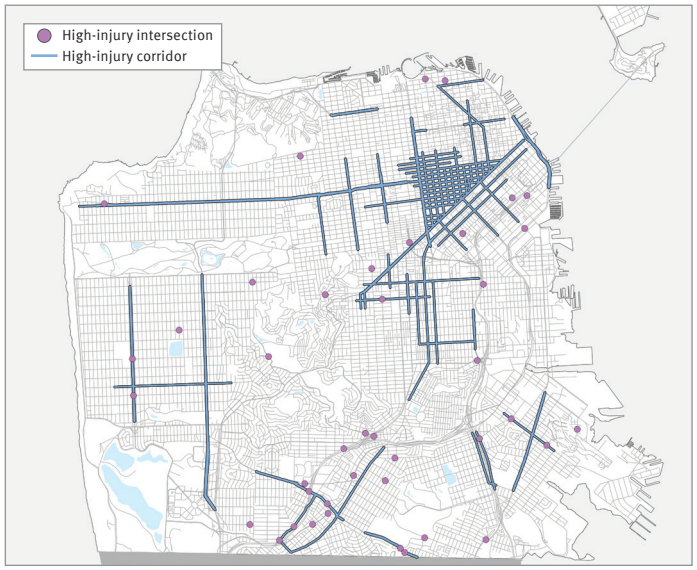
UNRELIABLE TRANSIT DISPROPORTIONATELY AFFECTS OUTER NEIGHBORHOODS

Livable neighborhoods are accessible by transit, not just during peak commute periods, but throughout the day and evening. This supports San Franciscans' ability to get to and from school, medical appointments and recreational activities by transit. Analysis of transit transfer rates and input received during outreach indicate that outlying neighborhoods, including the Bayview and Sunset, are less accessible throughout the day by transit. A shortage of maintained vehicles results in turning back buses and light rail vehicles before they serve outer neighborhoods, forcing riders into extra waits. The transit network in the lower-density Sunset neighborhoods and hilly Eastern Neighborhoods is less dense, resulting in fewer transit alternatives and fewer direct rides—and making reliability all the more important.

FIGURE 8. AUTOMOBILE TRIPS WITHIN SAN FRANCISCO BY LENGTH, 2040



SOURCE: SFCTA, SF CHAMP



SOURCE: WALKFIRST INVESTMENT STRATEGY, 2013

FIGURE 6. HIGH-INJURY PEDESTRIAN CORRIDORS

PLANNED INFILL LAND USE PATTERNS SUPPORT WALKING, BICYCLING, AND TRANSIT

The land use plans adopted by the San Francisco Planning Commission and Board of Supervisors over the last decade are expected to move us in the right direction, supporting infill and making walking and bicycling easier. As new residents and jobs locate in areas already convenient for bicycling and walking, the share of trips made by bicycling and walking is expected to grow slightly (Figure

1 Based on SFDPH Eastern Neighborhoods Impact Analysis which indicated that holding all other variables constant, a 15% increase in vehicle volume produces a 10% increase in pedestrian injury collisions.

2 Based on Association of Bay Area Governments population projections for San Francisco.

7) but additional investment is needed to meet the city's goal of more than 50% of trips by walking, bicycling and transit. San Francisco has a great potential for further increasing rates of walking and bicycling—as Figure 8 (previous page) shows, nearly 60% of all local automobile trips projected in 2040 will be less than three miles in length, a convenient distance for non-motorized travel.

COMMUNITY SUPPORT FOR TRADEOFFS IS CRITICAL TO ACHIEVE SAFE, EFFICIENT NETWORKS

Research shows that walkability contributes to the livability and affordability of neighborhoods and overall competitiveness of cities. Accordingly, the City has developed strategies that provide a vision for significantly improving the safety of pedestrian and bicycle networks (specifically, the SFMTA Bicycle Strategy and the Mayor's Pedestrian Strategy), but implementation requires investment and, at times, challenging tradeoffs. This is especially so where many of the easy, lower-cost fixes to improve bicycling and walking infrastructure (e.g., striping and signage) are already complete.

Improvements that more significantly benefit bicyclists and pedestrians do so by physically separating these travelers from vehicular traffic or by reducing vehicle traffic and speeds, which may require parking removal or increased signal delay for vehicles. Implementing these improvements requires leadership and community acceptance in return for increased safety for bicyclists and pedestrians.

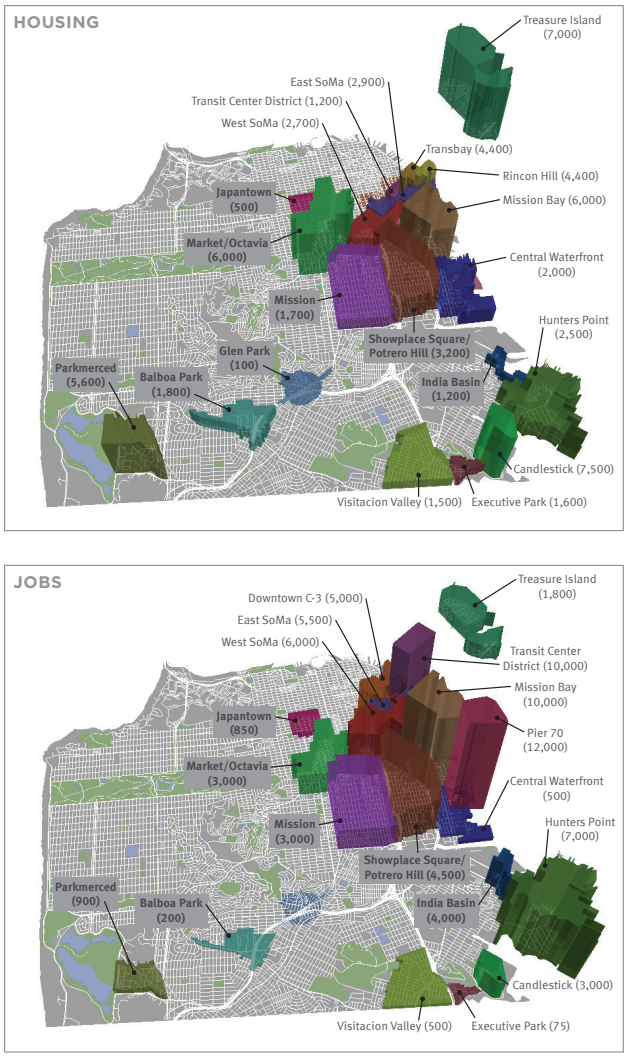
ECONOMIC COMPETITIVENESS

San Francisco's economic competitiveness depends on having an affordable and reliable transportation system with sufficient capacity to accommodate our travel needs efficiently.

PLANNED HOUSING AND JOB GROWTH CONTRIBUTES TO A MORE SUSTAINABLE CITY AND REGION

The Association of Bay Area Governments has forecast significant job and housing growth in the city. A city of about 800,000 residents and 570,000 jobs today is forecast to house nearly 1.1 million residents and more than 750,000 jobs by 2040—much of this

FIGURE 9. SAN FRANCISCO'S PROJECTED HOUSING GROWTH (TOP) AND JOBS GROWTH (BOTTOM) AREAS THROUGH 2040



SOURCE: SAN FRANCISCO CITY PLANNING DEPARMTENT (2013)

San Francisco's economic competitiveness depends on having an affordable and reliable transportation system with sufficient capacity to accommodate our travel needs efficiently.

By 2040, new growth will result in about 300,000 new transit trips per day on a system that is already strained by crowding and reliability issues.

growth is expected in the downtown core, southeast, and southwest (Figure 9). This would mean adding about 9,800 new residents each year for the next thirty years, compared to about 4,200 residents that have been added per year over the prior thirty years.

These projections reflect expectations for robust regional growth and regional policy stemming from Senate Bill 375 (2008), which required regional governments to reduce greenhouse gases from transportation. To meet the SB 375 target, the Regional Transportation Plan, known as Plan Bay Area, calls for concentration of growth in densely developed areas with good transit access especially in San Francisco, San Jose, and Oakland (Figure 10)—a pattern that supports less driving and produces fewer greenhouse gases.

INCREASED TRANSIT CAPACITY AND SERVICES ARE NEEDED TO ACCOMMODATE GROWTH

Concentrating jobs and housing in San Francisco is good for the city's economy as well as the environment, but will also increase congestion and transit system crowding in downtown San Francisco and Eastern neighborhoods. By 2040, new growth will result in about 300,000 new transit trips per day on a local and regional system that is already strained by crowding and reliability issues. The San Francisco Planning Commission has adopted land use plans that direct much of the city's projected growth in the central and eastern neighborhoods, where crowding is already acute. Figure 11 compares transit crowding today and in 2040,

FIGURE 10. POPULATION AND EMPLOYMENT GROWTH PROJECTIONS IN THE TOP 25 BAY AREA CITIES (2010-2040)

SOURCE: METROPOLITAN TRANSPORTATION COMMISSION, PLAN BAY AREA (2013)

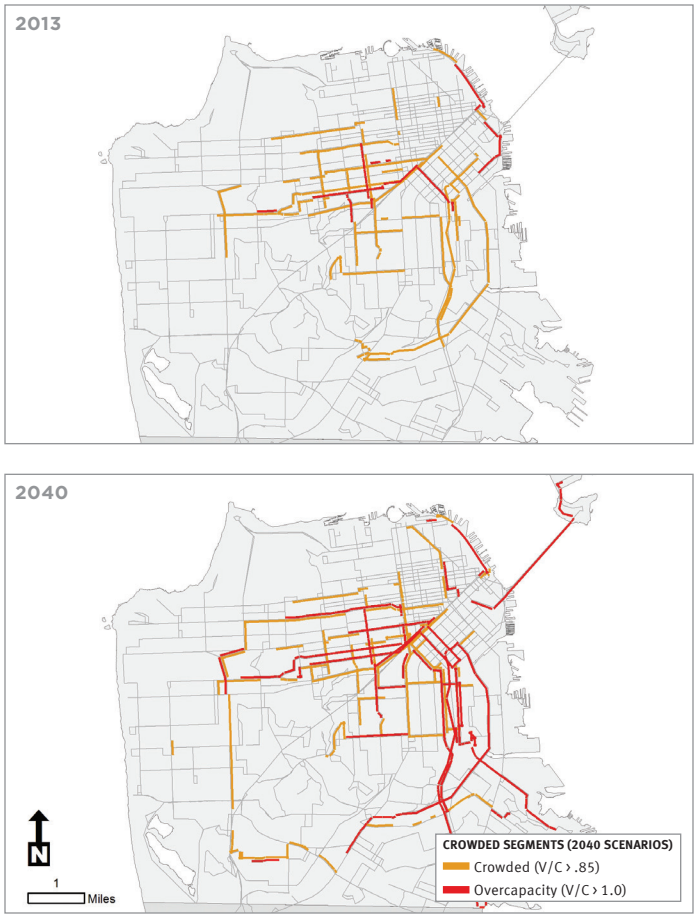
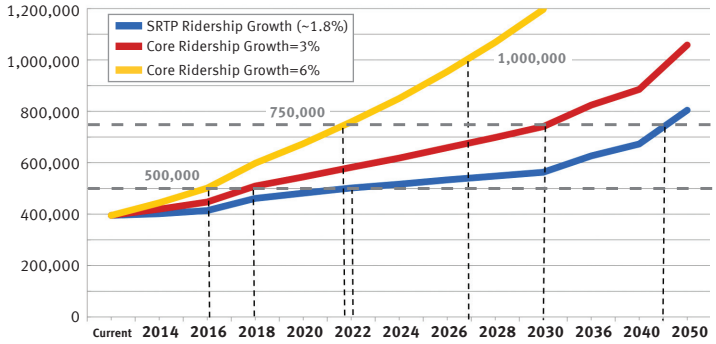


FIGURE 11. CROWDING* ON MUNI IN 2013 (TOP) AND IN 2040 (BOTTOM)

SOURCE: SFCTA, SF CHAMP

* Crowding is defined by the percent of person-hours traveled in crowded (passenger-volume-to-vehicle-capacity ratio is 85% or higher) or over-capacity conditions (volume to capacity ratio is more than 100%).

FIGURE 12. BART STATION CAPACITY CONSTRAINTS



SOURCE: BART

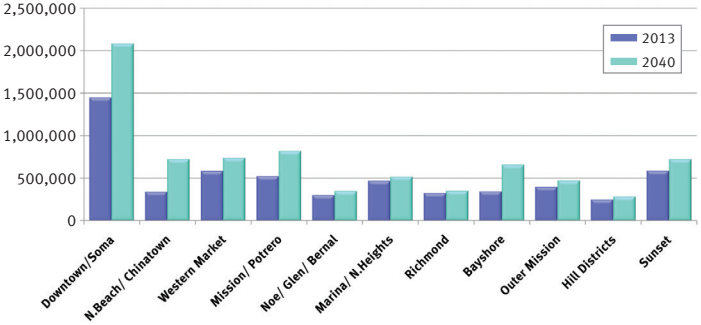
and shows that crowding will grow most on the lines expected to serve these areas and the new development areas, such as the southeast waterfront, Treasure Island, and Parkmerced.

Many regional bus and rail operators already face peak-period crowding and would also see that increase significantly by 2040. BART ridership to, from, and within San Francisco is projected to grow by 37%, and as such, the system's two most crowded stations, Embarcadero and Montgomery, are forecast to hit limits in their person-carrying capacity. BART estimates that at 500,000 daily system riders, stations will be at capacity in 2016, and at 750,000 system riders, the stations will experience significant backups at escalators and overcapacity platforms (Figure 12).

CAPACITY NEEDS MOST ACUTE IN THE CORE: DOWNTOWN, SOUTH OF MARKET, MARKET/OCTAVIA, AND EASTERN NEIGHBORHOODS

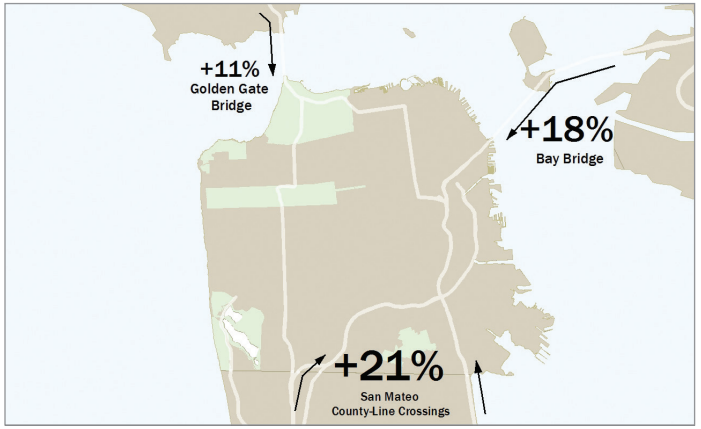
36% of trips to, from, or within San Francisco begin or end in the downtown and South of Market neighborhoods, more than any other neighborhood (Figure 13). Expected growth will significantly increase transit crowding and street congestion downtown. With projected growth and no new investment beyond already-planned projects, increased traffic will slow speeds to gridlocked conditions for cars and buses alike during peak hours. A nearly 30% reduction in projected private vehicle traffic would be necessary to avoid this condition (see Appendix C for detail). Strategies

FIGURE 13. DAILY PERSON TRIPS BY SAN FRANCISCO NEIGHBORHOOD



SOURCE: SFCTA, SF CHAMP. EACH BAR INCLUDES ALL TRIPS TO, FROM, AND WITHIN THE NEIGHBORHOOD.

FIGURE 14. CHANGE IN DAILY COUNTY LINE CROSSINGS BY AUTOMOBILE, 2012-2040



SOURCE: SFCTA, SF CHAMP

recommended to achieve this reduction are discussed on pages 29–30, and are incorporated into the SFTP Investment Plan, SF Investment Vision, and associated policy recommendations.

NETWORK DEVELOPMENT AND MANAGEMENT NEEDED FOR THE SOUTHEAST AND PENINSULA CORRIDORS

Over the SFTP period, daily automobile trips entering San Francisco from the South Bay are expected to grow by 21% (Figure 14). This results in worsening congestion on Highway 101 and 280. The planned extension of Caltrain to the new Transbay Transit Center would help accommodate this growth and provide access

for the future high speed rail system, but funding is incomplete. Better management of existing freeway space through high-occupancy vehicle lanes or other solutions is also needed.

WORLD CLASS INFRASTRUCTURE

San Francisco's transportation system relies on aging infrastructure that will need significant repair or replacement in the next decades. Without a significantly increased financial commitment to reach and maintain a state of good repair, riders will see increasing delays and crowding related to vehicle breakdowns, reduced service levels, and worsening pavement condition.

Without a significantly increased financial commitment to reach and maintain a state of good repair, riders will see increasing delays and crowding related to vehicle breakdowns, reduced service levels, and worsening pavement condition.

TRANSIT VEHICLE REPLACEMENT AND BETTER MAINTENANCE WOULD IMPROVE RELIABILITY

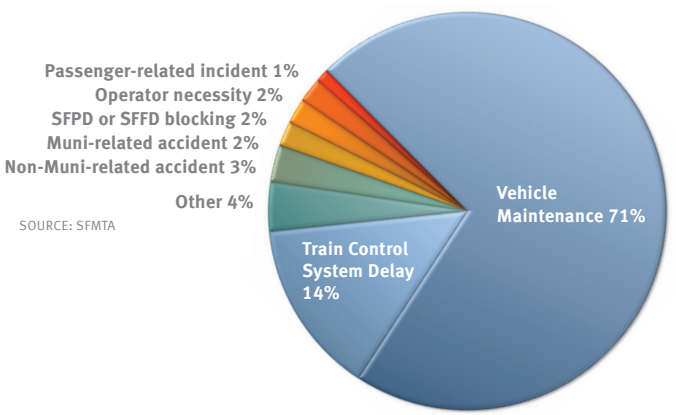
After decades of underinvestment, Muni and regional transit agencies that serve San Francisco have significant unfunded capital needs amounting to more than $5 billion through 2040 (see Appendix B for detail). These needs include new or updated facilities for maintaining transit vehicles, rail and overhead wire replacement, vehicle maintenance and replacement, and other needs.

As a result of resource limitations, Muni's vehicles have not received mid-life rehabilitations or timely replacement, resulting in a fleet that has high service unreliability and frequent expensive emergency repairs, as well as frequent unscheduled vehicle turnbacks. Figure 15 shows that vehicle maintenance is responsible for a large share of transit-service delays. Increased investment in routine maintenance and timely vehicle replacement would significantly reduce these delays and improve reliability. Figure 16 shows how breakdowns can be minimized with proper maintenance and mid-life replacement.

TRANSIT OPERATING COSTS ARE GROWING FASTER THAN REVENUES

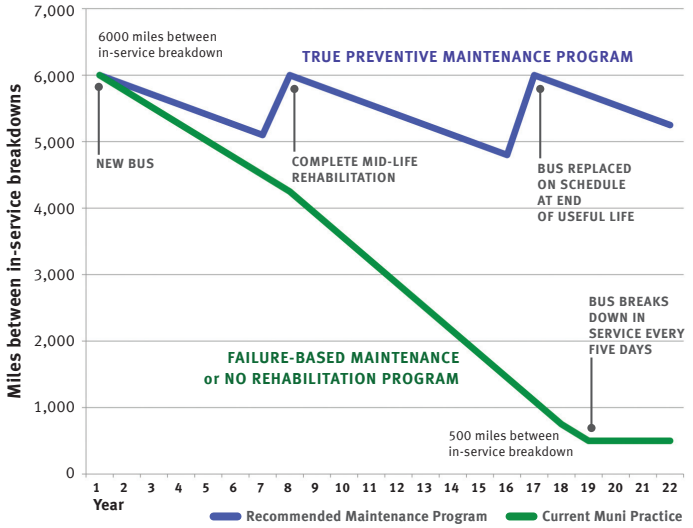
The cost of providing transit service has risen rapidly in recent years, a trend which destabilizes Bay Area transit systems and affects riders impacted by resulting service cuts. Figure 17 (next page) shows the rising real (inflation-adjusted) costs of transit

FIGURE 15. MUNI LIGHT RAIL: MAY 2013 REASONS FOR DELAY



SOURCE: SFMTA

FIGURE 16. LIFE CYCLE OF A TROLLEY BUS


Miles between in-service breakdowns
7,000
6,000
5,000
4,000
3,000
2,000
1,000
0
6000 miles between in-service breakdown
TRUE PREVENTIVE MAINTENANCE PROGRAM
NEW BUS
COMPLETE MID-LIFE REHABILITATION
BUS REPLACED ON SCHEDULE AT END OF USEFUL LIFE
BUS BREAKS DOWN IN SERVICE EVERY FIVE DAYS
FAILURE-BASED MAINTENANCE or NO REHABILITATION PROGRAM
500 miles between in-service breakdown
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22
Year
Recommended Maintenance Program
Current Muni Practice

SOURCE: SFMTA (FIGURE IS CONCEPTUAL)

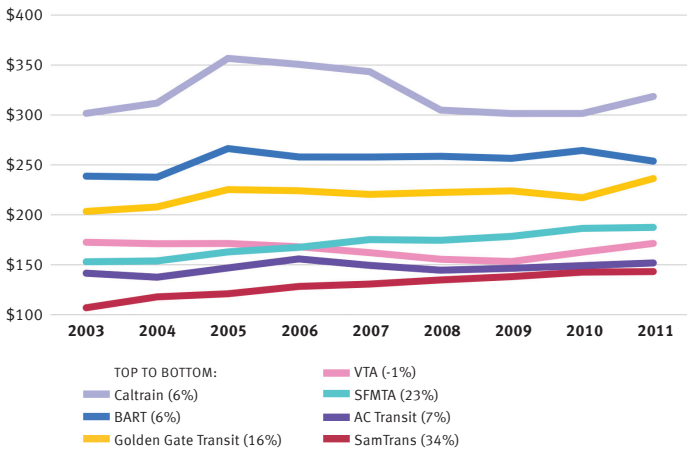
service for major Bay Area transit operators. In its Transit Sustainability Project (TSP) Report, the Bay Area MTC found that cost increases are primarily the product of employee fringe benefit cost growth (e.g. health care and pensions). Between 1997 and 2008, real fringe benefit costs at SFTMA, BART, and AC Transit grew by 72% (after adjusting for inflation), or about 5% per year.

Declining transit performance also affects operating costs. The TSP indicated that speeds on SFMTA's bus and light-rail system fell by more than 10% between 1997 and 2008. Slower speeds mean the same driver and vehicle can complete fewer route runs in a day, leading to less service for the same price.

RECENT IMPROVEMENT IN AVERAGE PAVEMENT CONDITION NEEDS INVESTMENT TO MAINTAIN

The city's Pavement Condition Index (PCI) has slowly fallen over time to the low 60s (fair) from 70s (good). The 2011 Proposition B streets bond enabled an increase in the PCI from 64 to 66 and provides increased funding levels until 2016. The PCI score is projected to fall into the 50s (at risk) by 2030. Without an additional investment in street rehabilitation and replacement, reaching and maintaining a PCI of 70 in the longer term will require about $2 billion more than what is already committed to street resurfacing over the life of the SFTP, but this is ultimately more cost-effective than further deferring maintenance needs. Maintaining pavement at a good condition costs $9,000 per block. If the PCI score lowers below 50, the cost to maintain pavement would balloon to $436,000 per block.

FIGURE 17. TRANSIT COSTS PER REVENUE SERVICE HOUR



SOURCE: NATIONAL TRANSIT DATABASE TS2.2, SERVICE DATA AND OPERATING EXPENSES TIME-SERIES BY SYSTEM, AND THE CALIFORNIA DEPARMENT OF FINANCE (FOR BAY AREA INFLATION DATA).

MORE EFFICIENT AND EFFECTIVE PROJECT DELIVERY IS NEEDED GIVEN GROWING CITYWIDE NEEDS

Small project delivery research indicates consensus that small projects and complete street projects can be delivered more efficiently, helping to lower unit costs or make improvements more quickly. As discussed on page 11, the scope of the city's goals for supporting bicycling, pedestrians, and efficient transit require that we construct improvements faster than we have historically. The Project Delivery Strategic Initiative of the SFTP (Appendices H and I) sought to identify opportunities to improve the timeliness, transparency, and efficiency of project implementation in San Francisco's transportation sector.

HEALTHY ENVIRONMENT

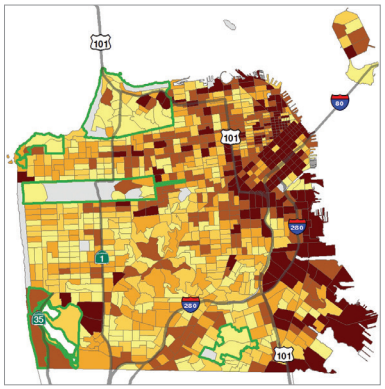
Reducing vehicle pollution—including greenhouse gases and other pollutants—is critical for a healthy environment. More stringent state vehicle emissions regulations will reduce vehicle pollution over the SFTP period, but growth in driving means that additional action will be necessary to for San Francisco to meets our aggressive greenhouse gas reduction goals.

VEHICLE TRAVEL GROWTH EXPECTED, ESPECIALLY TO AND FROM THE EASTERN NEIGHBORHOODS AND SOUTHWEST SAN FRANCISCO, THE PENINSULA

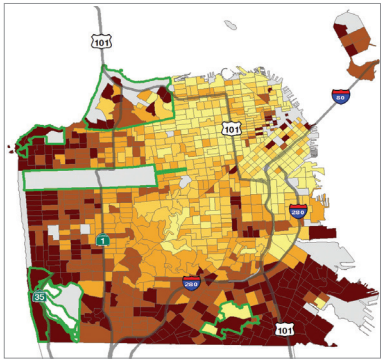
Miles driven by private vehicles, or VMT (vehicle miles of travel), are the main source of greenhouse gases and air pollutants from the transportation sector. Growing population and employment in San Francisco and regionally is expected to result in VMT in-

Research indicates that small projects and complete streets can be delivered more efficiently, resulting in more improvements and more "bang for the buck" as we invest in our streets.

FIGURE 18. VEHICLE MILES TRAVELED IN 2040. (DARKER COLORS INDICATE MORE VEHICLE MILES OF TRAVEL.)



Workplace Vehicle Miles of Travel per Worker



Household Vehicle Miles of Travel per Household Automobile

SOURCE: SFCTA, SF CHAMP

creases of approximately 30% by 2040 under a business as usual scenario. Much of this VMT will be generated by driving trips to and from the downtown core (for workplace VMT), and outlying southwest and southeast neighborhoods (for household VMT)—(Figure 18).

VEHICLE TECHNOLOGY ALONE WILL NOT ACHIEVE SAN FRANCISCO'S AMBITIOUS GOALS

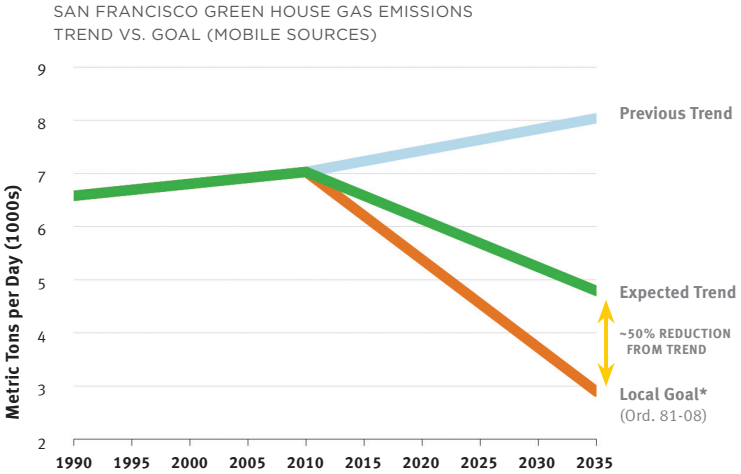
Technology will do much to reduce climate change impacts from private vehicles. Tough state laws (Pavley I and II) regulating vehicle emissions are expected to reduce greenhouse gases by more than 40%. However, this is not sufficient to allow San Francisco to achieve its aggressive greenhouse gas reduction goals, set by ordinance 81-08, which call for an 80% reduction below 1990 levels by 2050 (Figure 19). This is five times more aggressive than regional greenhouse gas reduction goals, and will take tremendous local committment and regional, state, and Federal support to achieve.

DEMAND MANAGEMENT STRATEGIES ARE CRITICAL TO ACHIEVING PROGRESS TOWARD OUR GOALS

Scenario testing conducted for the SFTP (see the "What would it take" sidebar box on page 19) revealed that, though necessary, supply-side investments such as major new transit lines and transit frequency are alone not very cost-effective at reducing greenhouse gases. Among the more cost-effective strategies are those that reduce vehicle tripmaking by more directly linking the cost or impact of driving to the decision to make a trip:

- **CONGESTION MANAGEMENT.** The Transportation Authority's 2010 Mobility, Access and Pricing study found that implementation of a peak-period congestion charge in San Francisco's northeast cordon would reduce vehicle delay by 21%, and greenhouse gases by 5% citywide, among other benefits. Congestion can also be managed through direct regulation of vehicle trips to the worksite.
- **EMPLOYER OUTREACH AND INCENTIVES.** Incentive and outreach programs in partnership with employers can provide employee travel counseling, transit promotions, tools to facilitate shared rides, and supportive services such as guaranteed ride home programs.

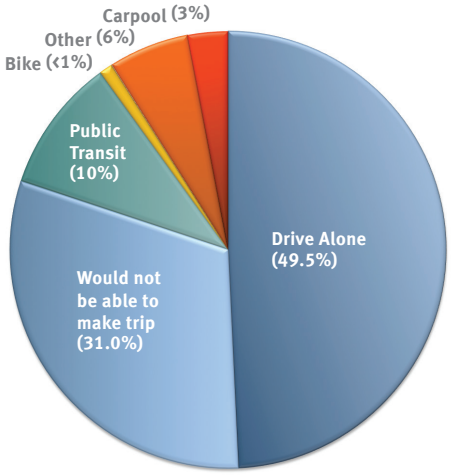
FIGURE 19. SAN FRANCISCO GREENHOUSE GAS (GHG) REDUCTION GOALS



* Assumes on-road mobile sector is responsible for proportional share of economy-wide goals set by Ordinance 81-08

SOURCE: SFMTA, SAN FRANCISCO CLIMATE ACTION PLAN

FIGURE 20. SHARE OF SHUTTLE USERS WHO WOULD DRIVE ALONE WITHOUT THE SHUTTLE*



SOURCE: SFMTA

*Surveys have indicated that shuttles are serving about 35,000 commute trips per day, or about 1% of all trips to, from, and within San Francisco.

- **PARTNERSHIPS WITH THE PRIVATE SECTOR AND COMMUNITY BASED ORGANIZATIONS.** The private sector is increasingly involved in providing transportation services, many of which could reduce single occupancy vehicle trips and greenhouse gases. The SFMTA Shuttle Partners program, for example, seeks to allow private employer shuttles to use Muni stops in exchange for a fee. SFMTA's data indicates that shuttles displace over 45 million vehicle miles traveled and 11,000 metric tons of GHG per year, and about half of shuttle riders say they would drive alone without shuttle access (Figure 20).

WHAT WOULD IT TAKE TO MEET SFTP GOALS?

To meet our adopted goals and targets for livability, world-class infrastructure, economic competitiveness, and a healthy environment would require significantly increased funding; commitments to prioritize our limited rights of way for transit, walking, and bicycling; and closer linking of the cost of driving to the decision to make a trip. Each of the aspirational scenarios described below includes a package of supply-side and demand-side improvements valued at about $10 billion above and beyond revenues we expect to have. The complete findings of "what it would take" to meet San Francisco's ambitious goals are included in Appendix B and summarized below.

LIVABILITY. We examined what it would take to meet the city's "transit first" goal of no more than 50% of daily trips by car. Expanding the capacity of transit (such as a with a second BART tube across the bay) and elevating safety through citywide traffic calming, road diets, a cycle track network, and more, decreased the expected share of trips by car by 6 percentage points to 53%. Only when paired with demand-management measures (congestion pricing) is the goal achieved (Muni and San Francisco's share of BART and Caltrain).

WORLD-CLASS INFRASTRUCTURE. We asked how much funding would be required to maintain our road conditions and transit system in a state of good repair in 2040. The unfunded cost to meet this goal is approximately $5 billion for the transit system and $1.5 billion for streets, which is in excess of the uncommitted funding available over the plan period. New revenues will be required just to meet these basic needs.

ECONOMIC COMPETITIVENESS. Competitive and reliable travel times are critical for businesses and their workers, customers, and suppliers. We analyzed what it would take to keep commute travel times from worsening in the future, given the large projected increase in new residents and jobs in the city. We found that transit and driving commute times in 2035 could be maintained at today's levels (average of 40 minutes), but it would take $5 billion worth of investments in new transit supply including an extension of Caltrain to downtown, bus rapid transit projects on key corridors, and other improvements, as well as demand management approaches including peak period area pricing and related mobility improvements.

HEALTHY ENVIRONMENT. In partnership with the city's Climate Action Plan team, we tested what it would take to meet the city's goal of reducing greenhouse gas emissions to 80% below 1990 levels by 2050. We found this goal is only possibly attainable with a robust combination of aggressive local and regional vehicle pricing, widespread use of electric vehicles, and major new infrastructure (including a new BART tube across the Bay at a cost of $10 billion).

A consistent finding across all scenarios was that strategies to manage travel demand, such as community outreach and education campaigns, employee programs, peak-period or area pricing, and parking pricing, are much more cost-effective in achieving desired goals than supply-side investments.

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CHAPTER THREE

FUNDING OUR TRANSPORTATION NEEDS

SAN FRANCISCO'S NEEDS FOR TRANSPORTATION FUNDING—even to maintain the existing transit and street networks in today's condition—far exceed expected revenues, and most funds are already committed to specific projects and purposes. The SFTP proposes ways to invest expected funding most effectively to make progress toward our goals, but analysis shows that this progress is limited without policy changes and additional investment from new revenues. Based on public input and technical analysis, we have developed two scenarios (Figure 21) that invest strategically in a diverse set of projects to make meaningful progress towards each of the SFTP's four goals. Because there is far more need than available revenues for transportation, each scenario anticipates some new revenues:

- The Investment Plan shows how existing and some anticipated new federal, state, and regional revenue (consistent with the Bay Area's long-range transportation plan, Plan Bay Area) could be spent.
- The SF Investment Vision imagines how we could get further towards our goals with major new sources of local revenue.

This chapter summarizes the revenue forecasts for the two scenarios. The next chapter describes the investments we could make and what they could achieve, along with supporting policy recommendations to get the most out of our investments.

FIGURE 21. THE INVESTMENT PLAN AND SF INVESTMENT VISION

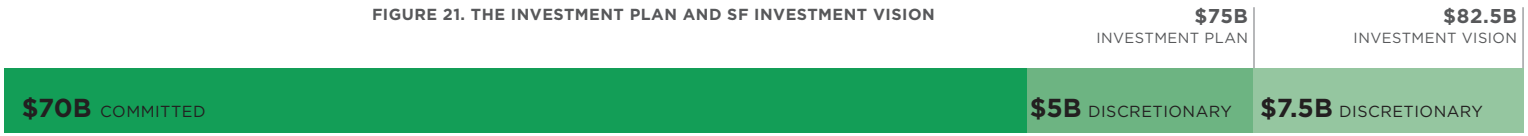
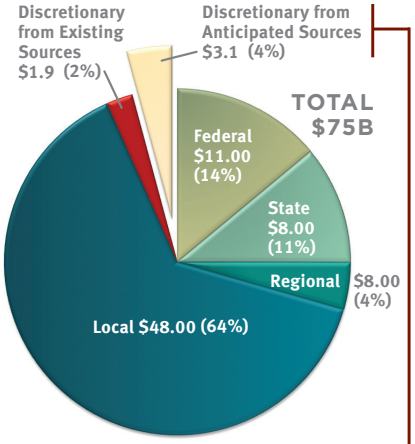
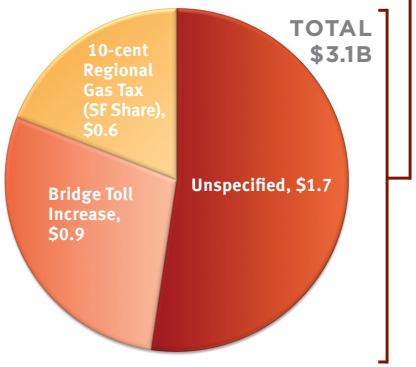


FIGURE 22. PLAN REVENUES BY SOURCE
(IN BILLIONS OF YEAR-OF-EXPENDITURE DOLLARS THROUGH 2040)



SOURCES OF ANTICIPATED NEW REVENUES



SOURCE: SFCTA (SEE APPENDIX D FOR DETAIL)

INVESTMENT PLAN: INCLUDES BOTH EXISTING AND ANTICIPATED NEW FEDERAL, STATE, AND REGIONAL REVENUE

The SFTP Investment Plan proposes how we should invest revenues we expect to have through 2040, including some expected new federal, state, and regional funds. About $75 billion in federal, state, regional and local revenue is expected for transportation in San Francisco through 2040. Figure 22 illustrates the sources of existing and anticipated new revenues for the Investment Plan. SFTP Appendix D describes the assumptions used to estimate expected revenues in more detail. All revenues are expressed in billions of year-of-expenditure dollars over the SFTP period.

MOST EXPECTED REVENUE IS FROM LOCAL AND REGIONAL SOURCES

The federal gas tax that funds transportation is not indexed to inflation, and has not been increased since 1992. Similarly, the state has struggled with budget deficits for years. As a result, the responsibility of paying for our transportation system increasingly falls on the shoulders of local and regional governments, or through direct user payment. Over 65% of the $75 billion expected for the Investment Plan comes from local and regional funding sources, such as the Prop K transportation sales tax and the $10 Prop AA vehicle registration fee.

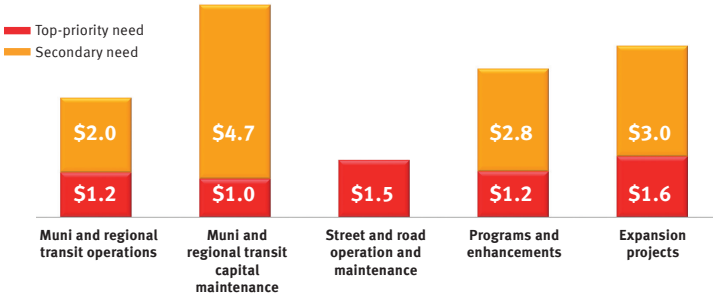
MOST EXPECTED REVENUES ARE ALREADY COMMITTED

Over 90% ($70 billion) of the expected funds are already committed to specific projects (such as the Presidio Parkway, Central Subway, and Caltrain Electrification) and purposes (such as transit and local streets operations and maintenance). This means that of the $75 billion in revenue we expect through 2040, only about $5 billion (or 7%) is discretionary, meaning we can decide how it should be invested to improve our transportation system.

ANTICIPATED REVENUES ARE INSUFFICIENT TO MEET OUR EXISTING AND FUTURE SYSTEM NEEDS

San Francisco's unfunded transportation needs far exceed the expected $5 billion in uncommitted revenue. Even if we spent every cent of discretionary funds on transit and streets maintenance, repair and replacement projects, we still would not have enough just to maintain the existing transportation system in a state of good repair—let alone make safety and livability enhancements or address planned growth. Figure 23 summarizes the transportation system investment need by category.

FIGURE 23. UNFUNDED TRANSPORTATION NEEDS BY CATEGORY



SOURCE: SFCTA, SFMTA, SFDPW, BART, MTC

TWO-PRONGED REVENUE STRATEGY

The SFTP (through its investment plans and policy recommendations) proposes ways to cost-effectively invest expected transportation funds, but analysis shows that this progress is limited unless we identify new revenues. So, the SFTP recommends a two-pronged revenue strategy. First, the Investment Plan seeks to position San Francisco well to compete for the anticipated additional new federal, state, and regional funding sources. Second, the SF Investment Vision calls for an additional $7.5 billion in locally-controlled transportation revenues. With $7.5 billion in additional local revenues, the SF Investment Vision achieves more of our maintenance, livability, and economic competitiveness goals, and makes more progress towards our ambitious environmental goals.

SF INVESTMENT VISION

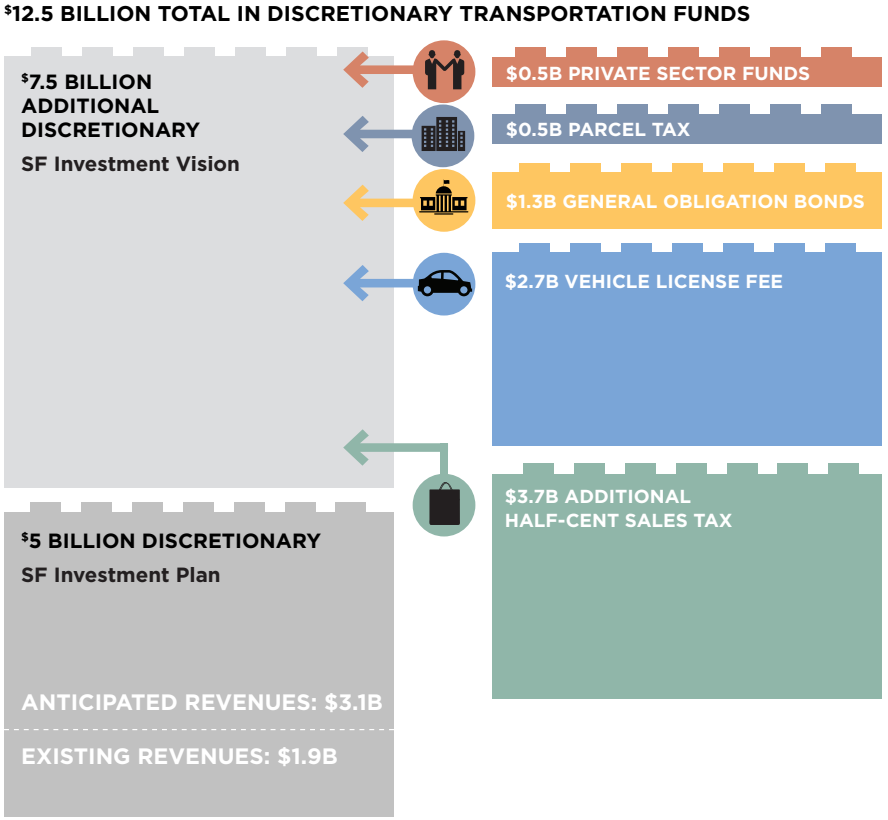
NEW LOCAL SOURCES OF FUNDING UNDER CONSIDERATION

For the SFTP, we evaluated a range of potential new local revenue sources, considering factors like revenue stability, growth potential, equity, and likelihood of being put into place. The SFTP Revenue White Paper provides a comparison table and information on the primary local sources we evaluated. A combination of sources pictured in Figure 24—such as general obligation bonds, a Vehicle License Fee, additional half-cent sales tax, or others could provide the $7.5 billion needed beyond the Investment Plan to achieve the $82.5 billion SF Investment Vision.

MAYOR'S 2030 TRANSPORTATION TASK FORCE

We coordinated SFTP development with the Mayor's 2030 Transportation Task Force. The Task Force has developed recommendations for potential new local transportation revenues, and has recommended that voters approve $1 billion in general obligation bonds, a half-cent increase in the sales tax, and a 1.35% increase in the vehicle license fee to generate just over $2.95 billion ($2013) in new transportation revenues between 2015 and 2030.

FIGURE 24. A COMBINATION OF SOURCES CAN PROVIDE $7.5 BILLION ADDITIONAL DISCRETIONARY



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CHAPTER FOUR

INVESTMENT PLANS AND POLICY RECOMMENDATIONS

THE SFTP IS THE BLUEPRINT for the future of our city's transportation system through 2040. With input from the public (detailed in Appendix E), and informed by other agencies and robust technical analysis (Appendices A, B, and F), we've developed two investment scenarios that will allow us to make meaningful progress toward our transportation goals: the Investment Plan and SF Investment Vision. The result is a diverse investment plan paired with specific policy actions and new revenues.

CONTENTS OF THE INVESTMENT SCENARIOS

The Investment Plan and SF Investment Vision are organized into three major categories of spending:

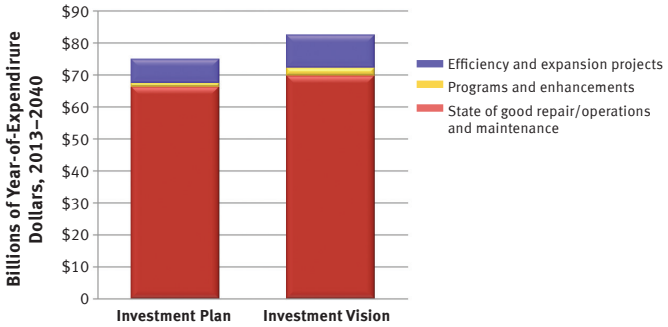
- **ONGOING MAINTENANCE AND OPERATIONS FUNDING.** Each investment scenario recommends funding levels for the ongoing maintenance and operations of our street network (including roadway-repaving street sweeping, traffic signal maintenance); and transit system operation, maintenance and replacement. The vast majority of funding is dedicated to this category.
- **TRANSPORTATION PROGRAMS AND ENHANCEMENTS.** This category includes funding for seven transportation programs that improve safety, expand or enhance the transportation system through small-to-medium scale improvements for all modes.
- **EFFICIENCY AND EXPANSION PROJECTS.** This category recommends funding for a list of major capital projects that would improve the efficiency of the existing system or cost-effectively expand system capacity.

Figure 25 (next page) provides an overview of the amount of funding dedicated to these categories in the Investment Plan and Investment Vision, and the remaining sections describe each category in detail.

The SFTP also recommends policy actions. This chapter highlights some of the key policy recommendations. For a complete list, see Appendix G.

We've developed two investment scenarios that will allow us to make meaningful progress toward our transportation goals: the Investment Plan and SF Investment Vision. What it takes is a diverse investment plan paired with specific policy actions and new revenues.

FIGURE 25. MAJOR USES OF INVESTMENT AND VISION REVENUES (COMMITTED AND DISCRETIONARY FUNDS)



SOURCE: SFCTA

DISCRETIONARY INVESTMENT: USES OF $5B AND $12.5B IN DISCRETIONARY FUNDS

As discussed in Chapter 3, 90% of the expected $75 billion in transportation revenue is dedicated to specific projects or purposes. This leaves $5 billion in expected and new revenues that we can decide how to spend. With the SF Investment Vision, a combination of new local funding sources can provide the additional $7.5 billion needed beyond the Investment Plan to go further toward our goals. Figure 26 summarizes the uses of expected and new discretionary funds in the Investment Plan and SF Investment Vision.

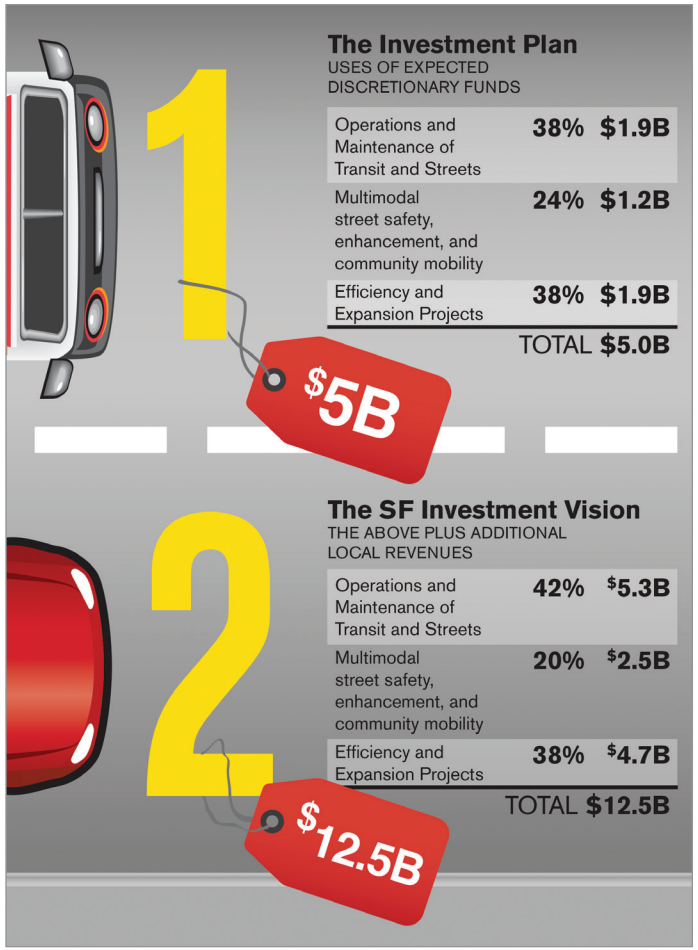
PLAN AND VISION INVESTMENTS

The following sections describe the investments proposed in the SFTP Investment Plan and SF Investment Vision.

DEDICATED MAINTENANCE AND OPERATING FUNDING

About $60 billion of the expected $75 billion in transportation revenue is already committed to operations and maintenance of the existing system and major projects that rehabilitate existing infrastructure. These include the Presidio Parkway, Yerba Buena Island Ramp Improvements, and Transbay Transit Center Phase 1. As discussed on page 16, an additional $5 billion is needed to maintain transit capital assets in an optimal state of good repair. Another $1.54 billion is needed to achieve the city's pavement condition goals. An additional $1.2 billion would be required to provide all of the transit service Muni is scheduled to provide today.[1] Figure 27 shows how we allocated funding to help address some of these maintenance and operations needs.

FIGURE 26. USES OF DISCRETIONARY FUNDS


The Investment Plan
USES OF EXPECTED DISCRETIONARY FUNDS
Operations and Maintenance of Transit and Streets 38% $1.9B
Multimodal street safety, enhancement, and community mobility 24% $1.2B
Efficiency and Expansion Projects 38% $1.9B
TOTAL $5.0B
1
$5B
The SF Investment Vision
THE ABOVE PLUS ADDITIONAL LOCAL REVENUES
Operations and Maintenance of Transit and Streets 42% $5.3B
Multimodal street safety, enhancement, and community mobility 20% $2.5B
Efficiency and Expansion Projects 38% $4.7B
TOTAL $12.5B
2
$12.5B

SOURCE: SFCTA

1 Funding constraints are one factor that currently prevents Muni from operating all scheduled service.

FIGURE 27. COMPARISON OF PLAN AND VISION FUNDING LEVELS FOR MAINTENANCE AND OPERATION

INVESTMENT CATEGORY	INVESTMENT LEVEL	PLAN	VISION
State of Good Repair / Operations and Maintenance			
Muni and Regional Transit: Operations. Provides funding to operate Muni and regional transit service.	**PLAN:** Maintain today's funding and actual service levels. **VISION:** Fully fund all today's scheduled service levels.	$43.80	$45.00
Muni and Regional Transit: Capital Asset Maintenance. Provides funding to maintain and replace Muni and regional transit vehicles, stations, and maintenance facilities.	**PLAN:** Fully fund transit vehicle replacement needs for all operators; all MTA vehicle mid-life overhauls; and 70% of Score 16 (most important) assets. **VISION:** Fund 100% of Muni Score 16 needs.	$12.41	$14.06
Local Streets and Roads: System Preservation. Provides funding to re-pave streets and roads.	**PLAN:** Maintain today's pavement condition. **VISION:** Reach and maintain pavement condition index of 70 ("good").	$3.27	$3.83
Local Streets and Roads: Operations. Provides funding for street sweeping, signal maintenance, and other roadway upkeep.	**PLAN AND VISION:** Maintain today's levels of street operations.	$2.80	$2.80
Local Street and Bridges Structures: Capital Maintenance. Provides funding to maintain or replace aging structures (e.g. bridges and tunnels).	**PLAN AND VISION:** Fund unmet need of $3M/decade.	$0.01	$0.02
State of Good Repair Projects. Funds major capital replacement and rehabilitation projects.	**PLAN AND VISION:** Provide full funding for the Presidio Parkway; Transbay Transit Center Phase I Improvements; and Yerba Buena Island Ramp Improvements.	$4.01	$4.01
	SUBTOTAL (AMOUNT IN $BILLIONS YOE)	$66.30	$69.72
	PERCENT OF TOTAL INVESTMENT	88%	84%

The Investment Plan provides sufficient funding to support mid-life vehicle overhauls for Muni, extending the life of each vehicle and reducing the incidence of vehicles that are out of service.

RECOMMENDATION:

PRIORITIZE REVENUES TO FULLY FUND TIMELY VEHICLE REPLACEMENT AND REHABILITATION

Underfunding vehicle maintenance contributes to reduced reliability and unscheduled service turnbacks in outlying neighborhoods, a top concern recorded during public outreach. The Investment Plan provides sufficient funding to meet vehicle replacement needs for all transit operators as well as to support mid-life vehicle overhauls for Muni, extending the life of each vehicle and reducing the incidence of vehicles that are out of service.

Local funds prioritized for this purpose will leverage significant regional and federal monies. An example is MTC's Transit Core Capacity program, which benefits Muni, BART, and AC Transit (all of which provide San Francisco service).

RECOMMENDATION:

EXPAND TRANSIT SERVICE WHILE SUPPORTING STEPS TO STABILIZE COSTS

New funding will be necessary to increase transit service frequencies to reduce crowding and serve new riders. However, new funding should be accompanied by measures to stabilize the rapid rise in transit operating costs (described on page 17). Such measures could include prioritizing projects to speed up Muni vehicles, such as the Transit Effectiveness Project; implementing transit operator fringe benefit cost control strategies recommended in the MTC's Transit Sustainability Project; and seeking a regional funding solution to stabilize Caltrain operating and capital funding. SFMTA and other transit agencies have already committed to a 5% real reduction in costs by fiscal year 2016–2017.

RECOMMENDATION:

ACHIEVE CITY GOALS FOR AVERAGE PAVEMENT CONDITION

Smoother roads benefit all modes of travel. The SFTP Investment Vision dedicates sufficient funding for San Francisco to achieve and maintain an average pavement condition index of 70, or "good," over the life of the plan. Streets maintained at pavement score 70 are several times less expensive to keep up than streets which aren't maintained at this level.

FIGURE 28. COMPARISON OF PLAN AND VISION FUNDING LEVELS FOR PROGRAMS AND ENHANCEMENTS

INVESTMENT CATEGORY	INVESTMENT LEVEL	PLAN	VISION
Programs			
Walking and Traffic Calming. Supports new and widened sidewalk construction, sidewalk bulb outs to shorten crossing distances, crosswalk upgrades, pedestrian countdown signals, landscaping, and vehicle speed control treatments.	**PLAN:** Provides $10m/year (exceeds historic funding levels). **VISION:** Funds full build out of the Mayor's Pedestrian Strategy.	$0.28	$0.63
Bicycling. Supports physical improvements on the citywide bicycle network, such as new cycle tracks (bike lanes physically separated from moving cars), bike lanes and paths, repair of existing lanes, bicycle parking, and bicycle outreach and education.	**PLAN:** Funds a citywide cycle track network. **VISION:** Funds full buildout of the SFMTA Bicycle Strategy.	$0.15	$0.60
Regional Transit Enhancements. Supports improvements for regional transit operators serving San Francisco, including BART, Caltrain, and Golden Gate Transit, such as additional escalators at stations, new signage, and station access improvements (e.g. more bike parking).	**PLAN:** Maintain historic levels. **VISION:** Increase moderately over historic levels.	$0.20	$0.35
Muni Enhancements and Customer First Treatments. Supports new Muni equipment to improve transit reliability and passenger amenities, such as on-vehicle cameras, ticket vending machines, and new station platform information displays, as well as new and improved transit stops.	**PLAN:** Maintain historic levels. **VISION:** Increase moderately over historic levels.	$0.19	$0.29
Street and Signal Upgrades and Street Network Development. Supports new traffic signs and signals, red light photo enforcement equipment, management of major arterials such as Guerrero or Lincoln, and new streets in developing areas of the City such as Hunters Point and Candlestick Point.	**PLAN:** Doubles historic funding levels. **VISION:** Triples historic funding levels.	$0.21	$0.28
Transportation Demand Management. Supports educational, outreach, and regulatory programs that reduce single-occupant vehicle use for commuters, schools and universities, and institutions.	**PLAN:** Increase of 20% over historic funding. **VISION:** Doubles historic funding levels.	$0.06	$0.10
Equity. Supports planning, project development, and service to promote equitable access and investment.	Provides $10M/year for planning, operations, and/or implementation	$0.14	$0.28
	SUBTOTAL (AMOUNT IN $BILLIONS YOE)	$1.23	$2.53
	PERCENT OF TOTAL INVESTMENT	2%	3%

TRANSPORTATION PROGRAMS AND ENHANCEMENTS

The Investment and SF Vision Plans provide $1.2 and $2.5 billion, respectively, to eight transportation safety and enhancement programs. Figure 28 describes how the funding levels compare to historic funding and the need.

RECOMMENDATION:

BUILD THE PEDESTRIAN AND BICYCLE STRATEGIES TO ESTABLISH SAFER NEIGHBORHOOD NETWORKS CITYWIDE

As discussed on page 11, the City has set aggressive goals for increasing the share of trips made by bicycling and walking while improving safety. Public outreach indicated that bicycling and walking infrastructure are top public priorities after basic transit operations and maintenance (See Appendix E). Accordingly, the plan and vision scenarios increase funding for traffic calming, walking, and bicycling programs (combined) by 80% and 400%, respectively, over historic funding levels. The vision-level funding is sufficient to support full implementation of the SFMTA's Bicycle and Pedestrian Strategies.

Funding for pedestrian and bicycle safety can be spent most effectively by focusing it on the roadways with the highest incidence of pedestrian and bicyclist injuries and fatalities, many of which are arterial roadways. The Pedestrian Strategy has identified these 70 miles of High-Injury Corridors, which represent only 6% of San Francisco's street miles, but 60% of severe and fatal injuries.

RECOMMENDATION:

CREATE MORE COMPLETE STREETS (AT LOWER COST) THROUGH COORDINATION WITH REPAVING

Safety and enhancement projects can be implemented more efficiently through coordination with roadway repaving, which occurs on a regular schedule city-wide. The SFTP recommends setting aside some Prop K funds to advance safety project coordination with re-paving projects, utility projects, and/or major capital investments. It also recommends developing a checklist for all repaving projects to facilitate consideration of complete streets elements.

RECOMMENDATION:

INCREASE INVESTMENT IN EMPLOYER, SCHOOL, AND COMMUNITY TRIP REDUCTION PROGRAMS

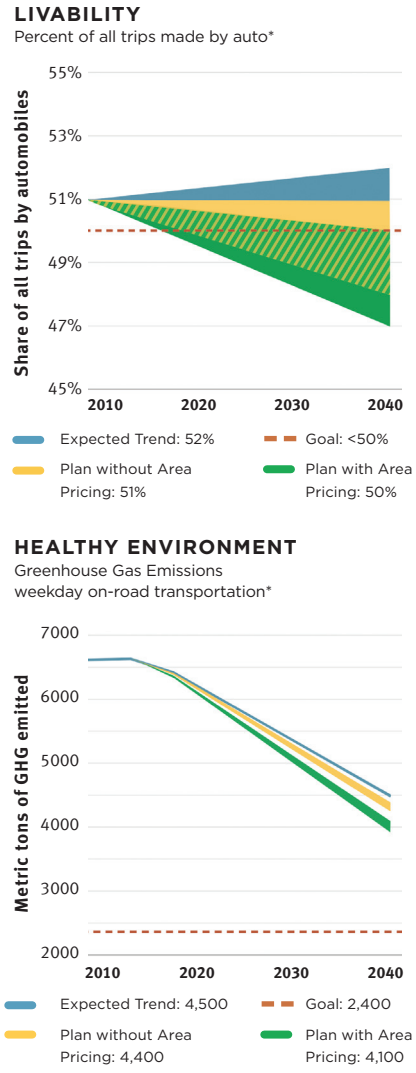
As described on page 16, San Francisco's downtown—especially as growth expands in SoMa and Mission Bay—will see transit performance decline if growth occurs as expected and travel behavior remains the same. The City's 1985 Downtown Plan introduced then-innovative demand management strategies, such as incentives for employers to provide employee travel counseling, helping to reduce peak period congestion and the need for parking. A new generation of incentive and outreach programs is needed for our growing downtown, especially South of Market and Eastern Neighborhoods. These partnerships with employers, institutions, and residential associations can provide travel counseling, incentives for taking transit, tools to facilitate shared rides, and supportive services such as guaranteed ride home programs. The SFTP increases funding for these travel demand management incentive programs by 20% and 100% over historic levels in the Investment Plan and Investment Vision, respectively.

RECOMMENDATION:

INCREASE TRANSPARENCY AND PROMOTE PUBLIC INVOLVEMENT BY SHARING AGENCY PRIORITIZATION AND DEVELOPMENT PROCESSES

Often during SFTP outreach, the public would express confusion about how San Francisco agencies identify, prioritize, and design street improvements. Fragmented institutional roles can also contribute to slower-than-desired project delivery rates. Small Project Delivery research conducted for the SFTP (Appendix H) found that coordination within and among agencies is inadequate to deliver a multi-modal vision, and that a consensus-based approach to project design diminishes the benefits of many projects. Strategies to increase project delivery and support quality projects include dedicating funds for increasing agency capacity, increasing transparency and coordination of agency prioritization processes, and enhancing public involvement in project development and planning efforts.

FIGURE 29. CONTRIBUTION OF AREA PRICING TO PLAN GREENHOUSE GAS AND AUTOMOBILE TRIP REDUCTION BENEFITS



* 2040 forecasts are derived from the Transportation Authority's regional travel demand Model, SF-CHAMP; the more ambitions end of the range represents additional travel demand management (TDM) program assumptions such as bikesharing, shuttles, carsharing, and other TDM policy efforts, which are calculated outside of the SF-CHAMP model and applied on top of modeling results.

A COMPREHENSIVE STRATEGY FOR THE SOUTH OF MARKET AND EASTERN NEIGHBORHOODS

The City's original 1984 Downtown Plan introduced new measures such as Transportation Management Associations (TMAs) to address the congestion caused by employment growth. Now a new wave of growth in the downtown, South of Market, and Mission Bay will significantly increase core crowding conflicts and congestion (see Appendix C). A comprehensive strategy is needed for the new, expanded core to manage congestion and maintain livability, including: transit capacity and other infrastructure; dedicated transit and bicycle networks; pedestrian safety measures; area-wide congestion and freeway management measures; and strengthened trip-reduction programs in partnership with employers.

RECOMMENDATION:
CONTINUE TO DEVELOP PRICING APPROACHES TO CONGESTION MANAGEMENT

Scenario testing conducted for the SFTP (see the "what would it take" sidebar box on page 19) revealed that the most cost-effective ways to reduce greenhouse gas emissions are those that reduce vehicle tripmaking by more directly linking the cost or impact of driving to the decision to make a trip. The Investment and SF Vision Plans recommend considering peak or area pricing in the Northeast Cordon, in addition to the pricing already approved for Treasure Island.[2] These projects require about $0.03 billion in start-up capital costs, which is less than .01% of the Investment

2 Analysis of Congestion Pricing can be found in the Mobility, Access, and Pricing Study (2008) on the Transportation Authority web site at www.sfcta.org. Information about Treasure Island pricing can be found at www.sfcta.org/TIMMA.

FIGURE 30. SFTP EFFICIENCY AND ENHANCEMENT PROJECT LIST

PROJECT	PLAN	VISION
Transbay Transit Center Phase 2/Caltrain Downtown Extension: Extension of Caltrain to the Transbay terminal	$2.60	$2.60
Central Subway: Extension of the T-Third light rail to downtown and Chinatown	$1.58	$1.58
Developer Funded Projects (Parkmerced, Mission Bay, Treasure Island, SE Waterfront Local Streets)	$0.90	$0.90
Caltrain Electrification/Signal System (SF remaining share of total cost)	$0.48	$0.48
Van Ness Avenue Bus Rapid Transit: Dedicated bus lanes and transit-priority treatments.	$0.13	$0.13
Long-Range Transit Network Development, including Transit Performance Initiative, one or more major projects to improve BART/Muni transit travel time, and reliability at key bottlenecks, such as the Embarcadero Muni Metro turnaround, the J-Church and N-Judah merge point, and at West Portal.	$0.14	$1.54
Expanded Transit Service and New Vehicles, Muni and Regional Operators: Increases funding for transit service by 1% over expected revenues and purchases new vehicles.	$0.41	$0.71
BART Metro: One or more major construction projects that allow BART to run more frequent transbay service to the core of San Francisco	$0.00	$0.50
M-Line West Side Alignment and Grade Separation: Relocate the M-Ocean View light rail line from the center of 19th Avenue near Stonestown to a dedicated transit lane on the west side of the road to remove conflicts with 19th Avenue auto traffic, improving pedestrian safety and transit travel speed/reliability (only environmental phase funded).	$0.12	$0.43
Better Market Street (transportation elements only): Re-designs and improves Market Street for transit, bicycling, and pedestrians.	$0.20	$0.39
Transit Effectiveness Project: Improves Muni reliability and reduces travel times system-wide through stop improvements such as bus bulb-outs, stop placement, lane modifications, signals, and other tools to prioritize transit.	$0.34	$0.34
Geary Corridor Bus Rapid Transit: Dedicated bus lanes and other transit priority treatments on Geary Boulevard to increase the speed and reliability of the 38/38-Limited lines.	$0.24	$0.24
Bayshore/Potrero Bus Rapid Transit: Dedicated bus lanes and other transit-priority treatments on Potrero Avenue and Bayshore Boulevard to increase the speed and reliability of the 9/9-Limited lines.	$0.13	$0.13
Freeway Performance Initiative: Convert freeway lanes and ramps to carpool and transit lanes, such as on I-280 between 6th Street and US 101.	$0.04	$0.13
Bi-County Program: Includes extension of the T-Third Street to Caltrain Bayshore Station and the Geneva-Harney Bus Rapid Transit	$0.09	$0.09
Bi-County Program, T-Third Street to Caltrain Bayshore Station: Extend the T-Third Muni Metro line and provide new service from Bayshore/Sunnydale to the Bayshore Caltrain station.	$0.05	$0.05

Plan Cost, but generate almost half the benefits of the Plan (Figure 29). They would also generate as much as $2.5 billion in revenue that could be re-invested into multimodal projects and programs.

EFFICIENCY AND EXPANSION PROJECTS

About six billion of the expected $75 billion in transportation revenue is dedicated to committed efficiency or expansion projects, including those under construction (Central Subway), fully funded (some development-related projects), or prioritized in regional agreements (e.g., Van Ness Avenue Bus Rapid Transit). The Investment Plan recommends dedicating about $2 billion in discretionary funding to plan our long-range transit network and provide efficiency and expansion investments. This includes new transit service and defined capital projects beyond existing commitments. See Appendix A for detail on how we prioritized projects for inclusion. Figure 30 lists project costs, and Figures 31 and 32 (pages 32, 33) illustrate project locations.

FIGURE 30 (CONTINUED)

PROJECT	PLAN	VISION
Bi-County Program, Geneva-Harney Bus Rapid Transit: Dedicated bus lanes from Bayshore Boulevard to Prague Street and transit-preferential treatments such as transit signal priority in mixed-traffic lanes from Prague to Ocean Avenue to increase the speed and reliability of the 28-Limited line.	$0.04	$0.04
Oakdale Caltrain Station: New Caltrain station at Oakdale Avenue in the Bayview.	$0.05	$0.05
Waterfront transit capacity and performance, e.g., E-Historic Streetcar Service between Fisherman's Wharf and the 4th Street Caltrain Station: Construct a turn-around track for streetcars at the Caltrain station necessary to provide permanent direct historic streetcar service between Fisherman's Wharf and the 4th Street Caltrain station.	$0.05	$0.05
Express Bus Service: Service from Candlestick and Hunters Point to Downtown.	$0.03	$0.03
Area Pricing, Capital Startup Costs: Northeast Cordon and Treasure Island.	$0.03	$0.03
Area Pricing, Ongoing Operations: Northeast Cordon and Treasure Island: Install a peak period congestion charge for cars entering or leaving downtown or Treasure Island, and invest net revenues in its implementation and related transit, pedestrian, bicycle and carpool alternatives.	N/A*	
Southeast Waterfront Transit Priority and Increased Service	N/A**	
SUBTOTAL (AMOUNT IN $BILLIONS YOE)	$7.57	$10.35
PERCENT OF TOTAL INVESTMENT	10%	13%

* The area pricing program raises approximately $2.5 billion in revenue (not reflected above) that is invested into supportive multimodal projects and programs.

** Southeast Waterfront improvements proposed to be funded by future growth in the general fund resulting from development.

RECOMMENDATION: CONTINUE RAPID TRANSIT NETWORK DEVELOPMENT, INCLUDING BUS RAPID TRANSIT

The most cost-effective transportation projects are those that make the most efficient possible use of existing infrastructure. Bus Rapid Transit is an affordable approach to creating a network of rapid transit along key corridors throughout San Francisco, including Geneva Avenue and Potrero / Bayshore Boulevard. Another example of making the most efficient use of existing infrastructure is the Transit Effectiveness Project, which cost-effectively improves transit travel times and reliability through transit-priority treatments on Muni's Rapid Network, the top lines that carry 75% of total transit ridership. Bus Rapid Transit could also be deployed to fill gaps in regional transit connections to the city's west side.

RECOMMENDATION: CONTINUE TO COORDINATE TRANSIT INVESTMENT WITH LAND USE DEVELOPMENT PLANS

With new state requirements to focus on reducing greenhouse gas emissions through more coordinated land use and transportation planning, regional funding frameworks increasingly emphasize Priority Development Areas (PDAs), where cities are planning for infill, transit-oriented growth. San Francisco agencies have identified PDAs, generally in the eastern part of the city. The Transportation Investment and Growth Strategy identifies the transportation needs to support this growth. As area plans and major developments are contemplated, such as along the Eastern Waterfront, transportation needs in all categories—operations and maintenance, safety and enhancements, and efficiency and expansion—should be identified and prioritized.

RECOMMENDATION: INVEST IN PLANNING AND PROJECT DEVELOPMENT TO REDUCE DISPARITIES

In response to concerns heard during SFTP outreach, we analyzed how transportation conditions such as safety, transit access, and reliability vary geographically in the city (see Appendix F). We found some disparities. For example, low-income communities experience disproportionately high numbers of pedestrian and bicyclist injuries and fatalities, and outlying neighborhoods experience worse transit reliability. We responded by proposing a set-aside equity funding program with $140 million for projects that improve equity and including equity as a consideration in project prioritization.

RECOMMENDATION:

SET A VISION FOR MANAGING THE CITY'S FREEWAY NETWORK

San Francisco's greatest increases in vehicle travel are projected to be to and from the eastern neighborhoods and the Peninsula/South Bay. Overall development and management strategies are needed for the US 101 and I-280 corridors. As the region develops the Bay Area Express Lane Network, San Francisco agencies should partner with Caltrans, the MTC, and neighboring cities and counties to develop a local strategy for managing our freeway network and related surface streets such as Potrero and Bayshore.

RECOMMENDATION:

IDENTIFY THE NEXT GENERATION TRANSIT NETWORK PRIORITIES FOR BART, CALTRAIN, AND MUNI

Addressing bottleneck points in our local and regional rail networks will significantly improve rides for existing and passengers and allow for new passengers on our system. and The SFTP identifies the need to establish a long-range, multi-operator transit network development strategy. The SF Investment Vision identifies up to $1.5 billion in expected and potential new revenues for expanding the capacity of BART, Caltrain, and Muni.

RECOMMENDATION:

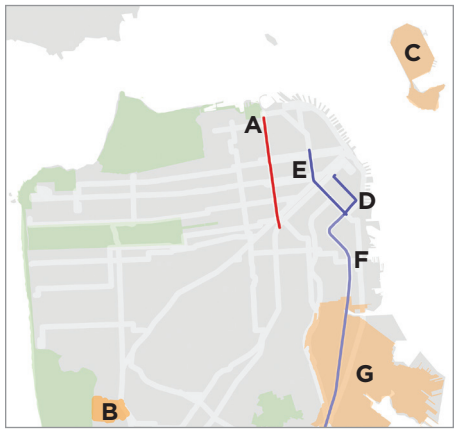
CONSIDER ALL OPTIONS FOR DELIVERING PROJECTS

Transportation projects may fall behind schedule and experience cost increases, and the public generally perceives delivery as taking too long. The SFTP Small and Large Project Delivery White Papers (Appendices H and I) explore strategies to aid project delivery. Key recommendations include consideration of a wide range of public-private partnership opportunities for major capital improvements such as the Caltrain Downtown Extension to the rebuilt Transbay Terminal, and the Treasure Island Transportation Improvement Plan.

INVESTMENT PLAN AND VISION SCENARIO BENEFITS

San Francisco's needs for transportation funding far exceed expected revenue. The SFTP proposes ways to invest the dollars we expect to have to most effectively make progress towards our goals, but analysis shows that our progress will be limited unless we identify new revenues. Figure 33 (pages 34–35) illustrates the additional benefits possible through higher funding levels. See Appendix J for more detail on plan performance results.

FIGURE 31. COMMITTED EFFICIENCY AND ENHANCEMENT PROJECTS



$9.43 billion in expected revenue is dedicated to projects that San Francisco has already committed to building.

A. Van Ness Bus Rapid Transit

B. Improvements to support development of Parkmerced

C. Improvements to support development on Treasure Island including

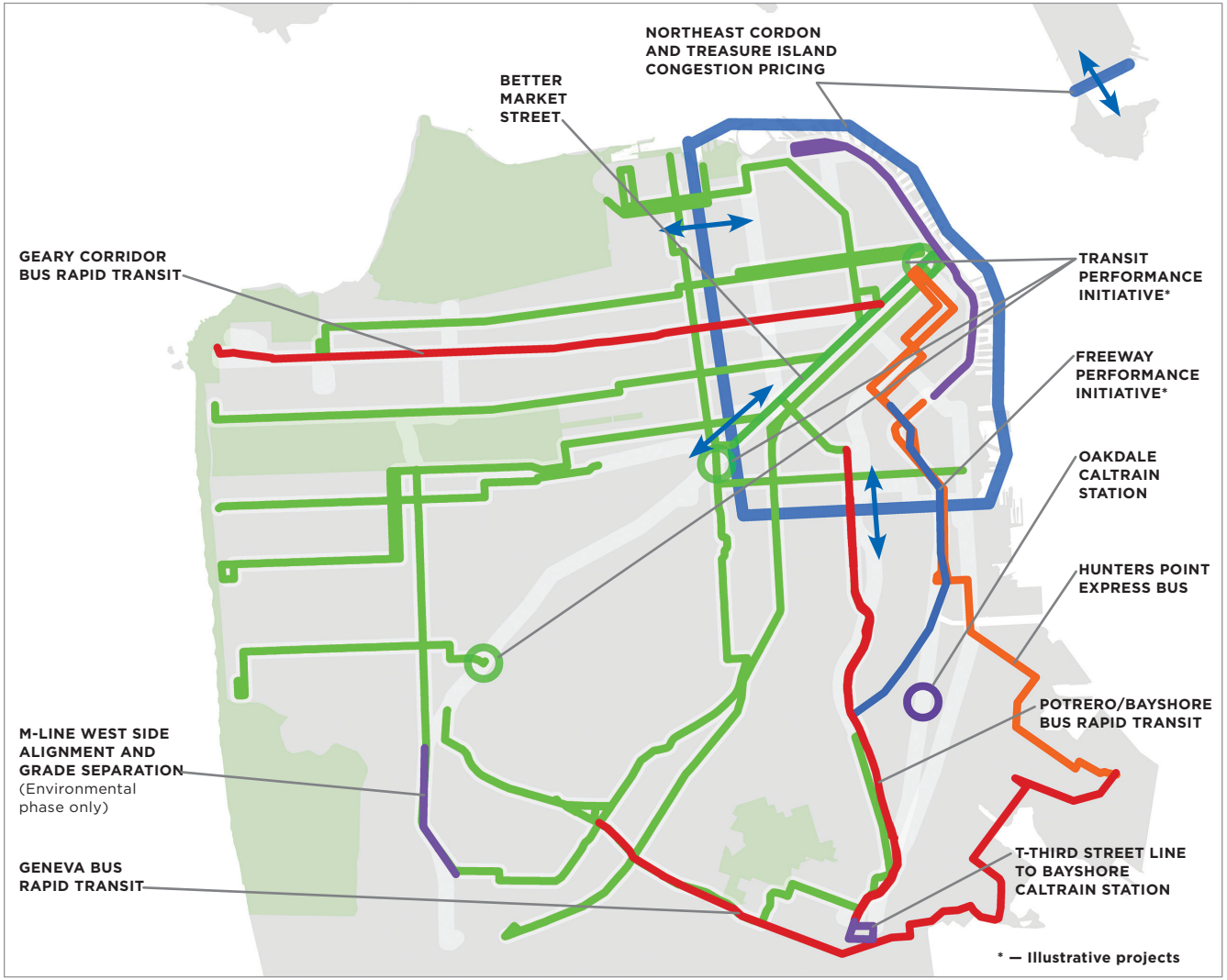
D. Extension of Caltrain to Downtown

E. Central Subway

F. Caltrain Electrification and signal system upgrade

G. Improvements to support development of Candlestick Point/Hunters Point-Shipyards

FIGURE 32. INVESTMENT PLAN DISCRETIONARY EFFICIENCY AND ENHANCEMENT PROJECTS


NORTHEAST CORDON AND TREASURE ISLAND CONGESTION PRICING
BETTER MARKET STREET
GEARY CORRIDOR BUS RAPID TRANSIT
TRANSIT PERFORMANCE INITIATIVE*
FREEWAY PERFORMANCE INITIATIVE*
OAKDALE CALTRAIN STATION
HUNTERS POINT EXPRESS BUS
POTRERO/BAYSHORE BUS RAPID TRANSIT
M-LINE WEST SIDE ALIGNMENT AND GRADE SEPARATION (Environmental phase only)
GENEVA BUS RAPID TRANSIT
T-THIRD STREET LINE TO BAYSHORE CALTRAIN STATION
* — Illustrative projects
Transit Efficiency
Bus Rapid Transit
Express Bus
Rail Transit
Pricing and Demand Management

WORLD CLASS INFRASTRUCTURE

1

$5B

The Investment Plan

USES OF EXPECTED DISCRETIONARY FUNDS

Operations and Maintenance of Transit and Streets	38%	$1.9B
Multimodal street safety, enhancement, and community mobility	24%	$1.2B
Efficiency and Expansion Projects	38%	$1.9B
	TOTAL	$5.0B

70%

70% of highest priority transit maintenance needs met

Increased vehicle maintenance to reduce service turnbacks, increase reliability

19%

Reduce transit crowding 19% on ten most crowded Muni lines

Maintains today's pavement condition

2

$12.5B

The SF Investment Vision

THE ABOVE PLUS ADDITIONAL LOCAL REVENUES

Operations and Maintenance of Transit and Streets	42%	$5.3B
Multimodal street safety, enhancement, and community mobility	20%	$2.5B
Efficiency and Expansion Projects	38%	$4.7B
	TOTAL	$12.5B

100%

100% of Highest Priority Transit Maintenance Needs Met

38%

Reduce transit crowding 38% of ten most crowded Muni lines

Pavement condition improves to "good" levels

The SF Investment Vision also funds some maintenance of local bridges and street structures.

FIGURE 33. COMPARISON OF PLAN AND VISION SCENARIO BENEFITS

SAFE STREETS AND VIBRANT NEIGHBORHOODS

20MI

About 40% of the City's Pedestrian Safety Strategy funded (nearly 20 miles) of pedestrian safety improvements

22%

Nearly 22% of the City's Bicycle Strategy funded

40MI

100% of the City's Pedestrian Safety and Bicycle Strategies (Over 40 miles of pedestrian safety improvements)

100%

100% of the City's Bicycle Strategy funded

Both scenarios include dedicated planning funds to develop safety and mobility projects in Communities of Concern and neighborhoods citywide

HEALTHY ENVIRONMENT

10%

Up to 10% reduction in auto trips

Expanded employer, school and community trip reduction partnerships

12%

Up to 12% reduction in GHG emissions

14%

Up to 14% reduction in auto trips

Freeway management and transit efficiency strategies to increase safety and encourage carpools.

15%

Up to 15% reduction in GHG emissions

Multimodal investments and demand management, including area pricing, downtown and on Treasure Island account for half of these benefits in both scenarios

ECONOMIC COMPETITIVENESS

15MI

15 miles of protected transit lanes including Bus Rapid Transit on key corridors

14%

14% improvement in Muni speeds on rapid network

33MI

Up to 33 miles of protected transit lanes

Increased BART capacity and reliability

18%

18% improvement in Muni speeds on rapid network

Muni Metro system bottlenecks addressed to improve reliability and travel times

Additional Caltrain service and/or BART express buses increase rapid connections to the South and East Bays.

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CHAPTER FIVE

NEXT STEPS

THE SFTP WILL SHAPE THE WORK of the Transportation Authority and our partner agencies in the years to come. Major next steps are:

- Rolling out the first five years of SFTP investments through an Early Action Program.
- Coordinating with the Mayor's 2030 Transportation Task Force and other local and regional partners to pursue new local revenues to address unmet transportation needs.
- Conducting monitoring and evaluation to ensure efficient and equitable progress towards SFTP goals.

Additionally, the SFTP itself will be updated approximately every several years.

EARLY ACTION PROGRAM

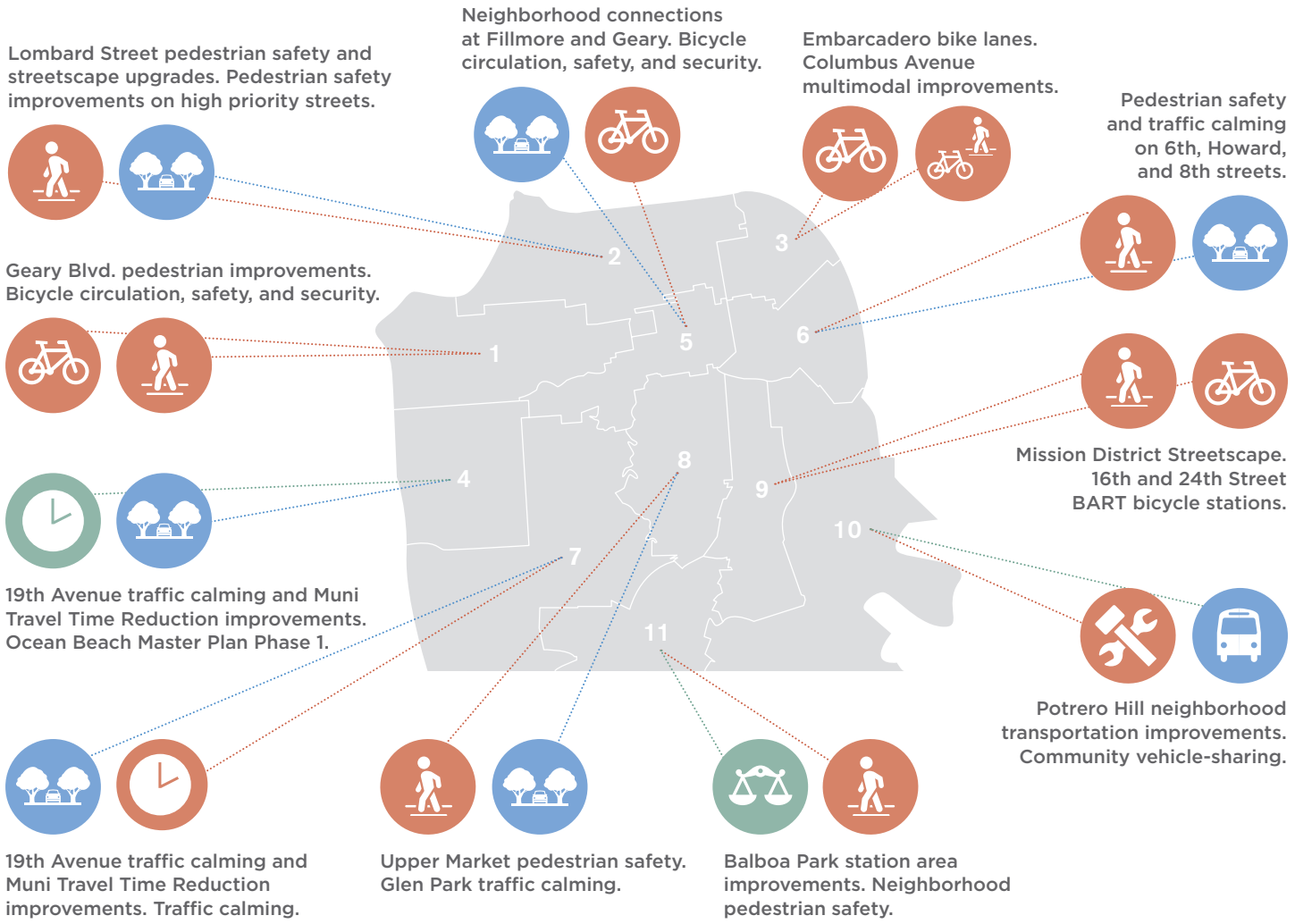
The Early Action Program represents the first five years of the 30-year SFTP and will fund improvements in every part of the city for every mode of travel. The Early Action Program uses the Prop K transportation sales tax and its ability to leverage federal, state and other funds to direct hundreds of millions of dollars toward SFTP investments. Over the next five years, city and regional agencies will work to define and implement these projects. The Figure 34 (next page) shows a representative sample of potential Early Action Program projects. We anticipate Early Action Program projects in each District. Information about these projects is available through the Authority's interactive web site, www.mystreetsf.com. We anticipate Transportation Authority Board approval of the Early Action Program in Spring 2014.

NEW REVENUES

We evaluated a range of potential new local revenue sources to meet existing and future transportation needs. A combination of sources such as private sector funds, a parcel tax, sales tax, and vehicle license fee are possible candidates for generating the additional $7.5 billion recommended for the SFTP vision. Over the past year, we worked closely with the Mayor's 2030 Transportation Task Force, which has recommended a vehicle license fee, general obligation bonds, and a half-cent sales tax increase for the 2014 and 2016 ballots. We will continue

The Early Action Program represents the first five years of investments for the 30-year SFTP and will fund improvements in every part of the city for every mode of travel.

FIGURE 34. EARLY ACTION PROGRAM: REPRESENTATIVE PROJECTS IN THE FIRST FIVE YEARS OF THE SFTP


Lombard Street pedestrian safety and streetscape upgrades. Pedestrian safety improvements on high priority streets.
Neighborhood connections at Fillmore and Geary. Bicycle circulation, safety, and security.
Embarcadero bike lanes. Columbus Avenue multimodal improvements.
Pedestrian safety and traffic calming on 6th, Howard, and 8th streets.
Geary Blvd. pedestrian improvements. Bicycle circulation, safety, and security.
Mission District Streetscape. 16th and 24th Street BART bicycle stations.
19th Avenue traffic calming and Muni Travel Time Reduction improvements. Ocean Beach Master Plan Phase 1.
Potrero Hill neighborhood transportation improvements. Community vehicle-sharing.
19th Avenue traffic calming and Muni Travel Time Reduction improvements. Traffic calming.
Upper Market pedestrian safety. Glen Park traffic calming.
Balboa Park station area improvements. Neighborhood pedestrian safety.
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to work with the Mayor's Office, partner agencies, and stakeholders to pursue new local, regional, state, and federal transportation funding sources. The Mayor's Transportation Task Force is further analyzing next steps for potential new local revenues.

MONITORING AND EVALUATION

Performance measurement is one of the Transportation Authority's statutory functions in its capacity as Congestion Management Agency, and as administrator of the Prop K half-cent transportation sales tax. The Transportation Authority will focus on performance tracking and evaluation in the following areas of policy interest, spanning the monitoring of system needs and trends, project delivery, and project effectiveness:

- **ONGOING MONITORING AND REPORTING.** Through biennial monitoring as Congestion Management Agency, and through www.mystreetsf.com, the Transportation Authority will track and provide information to the public on the delivery of transportation projects, including those identified for implementation in the Early Action Program. The Transportation Authority will also support the City's efforts to monitor the transportation obligations within development agreements.
- **DEMOGRAPHIC AND TRIP-MAKING TRENDS.** The Transportation Authority will continue to monitor demographic and travel behavior trends and the effect of new growth on the transportation system.
- **TRANSIT SYSTEM PERFORMANCE, ESPECIALLY EQUITY AND RELIABILITY.** SFTP outreach revealed that transit reliability is a socioeconomic and geographic equity issue, as well as a top priority for the general public. Yet data measuring and tracking reliability are limited. More research is needed to improve reliability measurement. Equity monitoring should additionally track safety trends and affordability outcomes.
- **DOCUMENTING THE COST EFFECTIVENESS OF TRANSPORTATION INVESTMENTS THROUGH BEFORE-AND-AFTER STUDIES.** The Transportation Authority will work with implementing agencies to strategically evaluate the effectiveness of new projects and programs to inform future project selection and prioritization, especially in the areas of pedestrian safety, traffic calming, and travel demand management.

Major next steps are:
Rolling out the first five years of SFTP investments through an Early Action Program, pursuing new local revenues to address unmet transportation needs, and conducting monitoring and evaluation to ensure efficient and equitable progress towards SFTP goals.

STAFF ACKNOWLEDGEMENTS

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Appendix A

SFTP INVESTMENT PLAN DEVELOPMENT PROCESS

KEY TOPICS

- How the SFTP investment plan and investment vision plan are structured
- How projects were selected for inclusion in the investment plans
- How programmatic funding levels were set

1 Introduction

1.1 | Overview

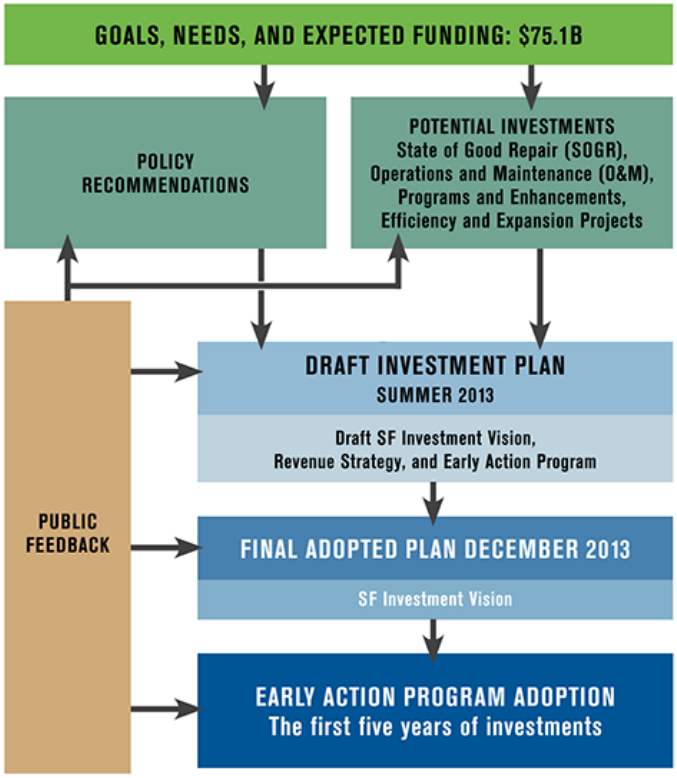
The core of the San Francisco Transportation Plan is an investment plan that details how available transportation funds will be spent between now and 2040. This document describes how the investment plan was created.

The investment plan includes two funding scenarios. The financially-constrained scenario matches available revenues to future investments. The vision plan demonstrates how outstanding transportation needs could be met with new revenues.

Investment plan funding is grouped into four categories:

- **Baseline / already committed projects.** These include all major projects that the city has already committed to, such as the Transbay Transit Center, the Presidio Parkway, and others.
- **The ongoing maintenance and operations ("State of Good Repair") category** includes funding for roadway-repaving and operation (e.g. street sweeping, traffic signal maintenance); and transit system operation, maintenance and vehicle replacement. This funding is programmatic, meaning that it provides

Figure 1. SFTP Development Process


GOALS, NEEDS, AND EXPECTED FUNDING: $75.1B
POLICY RECOMMENDATIONS
POTENTIAL INVESTMENTS
State of Good Repair (SOGR), Operations and Maintenance (O&M), Programs and Enhancements, Efficiency and Expansion Projects
PUBLIC FEEDBACK
DRAFT INVESTMENT PLAN
SUMMER 2013
Draft SF Investment Vision, Revenue Strategy, and Early Action Program
FINAL ADOPTED PLAN DECEMBER 2013
SF Investment Vision
EARLY ACTION PROGRAM ADOPTION
The first five years of investments

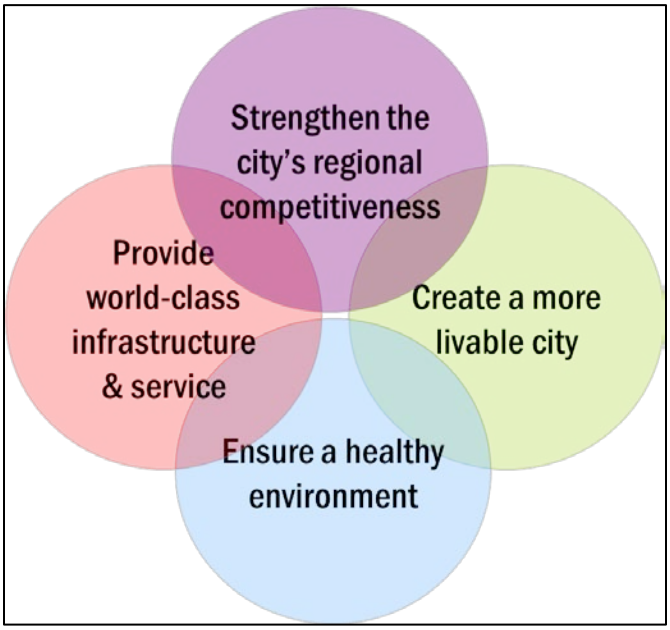
flexible funding for categories of improvements rather than for specific, defined projects. It is also referred to as "State of Good Repair" funding in that it maintains the existing transportation system rather than expanding or enhancing it.

- **The transportation program category** includes funding for seven transportation programs that expand or enhance the transportation system. These include: (1) Street/signal upgrades and street network development, (2) walking and traffic calming, (3) bicycling, (4) MUNI enhancements, (5) regional transit enhancements, (6) transportation demand management, and (7) equity. This programmatic funding is also flexible and can be spent on a variety of project types as long as they are consistent with the definition of the category.
- **The ranked transportation projects category** includes funding for a list of specific transportation capital projects. Each project has a defined location, project description, and cost estimate.

The process for developing these components of the SFTP included the following sub-steps:

- **Develop goals and performance measures.** Goals and performance measures were developed to guide which types of projects and programs should be prioritized. Four goals were selected (Figure 2)[1]
- **Estimate available revenues.** About $75 billion in federal, state, and local revenue is expected for transportation in San Francisco through 2040. Over 65 percent of this will come from local and regional funding sources, such as the Prop K transportation sales tax and the Prop AA vehicle registration fee. About 80 percent of this funding is required to operate and maintain today's transit and street networks in their current condition. An additional $10B is committed to projects and investments that are already underway (such as the Presidio Parkway, Central Subway, Caltrain electrification, Van Ness Avenue Bus Rapid Transit, and more). This means that of the $75 billion in revenue we expect through 2040, only about $5 billion is uncommitted revenue. SFTP Appendix B describes the assumptions used to estimate available revenues in more detail.

Figure 2. SFTP Plan Goals


Strengthen the city's regional competitiveness
Provide world-class infrastructure & service
Create a more livable city
Ensure a healthy environment

- **Estimate funding needs by category.** Future transportation needs were assessed through a comprehensive needs analysis (see the Needs Analysis White Paper for more detail), and

[1] The SFTP goal areas were developed through a collaborative process that drew on goals identified in the 2004 Countywide Transportation Plan, city policies like Transit First and the Climate Action Plan, and input from the public and other city agencies.

through a public call for transportation project proposals, described in the SFTP Appendix D: Outreach Summary.

- **Allocate available discretionary revenues roughly between the major plan categories.** Available revenues were roughly divided amongst the major categories (e.g. state of good repair, transportation programs, and capital projects). The financially-constrained scenario allocates 13 percent of revenues to already-committed projects; 83 percent to state of good repair needs; about one percent to transportation programs; and about 3 percent to major capital projects.
- **Rank capital projects.** Candidate capital projects were ranked to determine which should receive funding in the plan and which should be candidates for receiving any new revenues.
- **Set programmatic funding amounts.** Discretionary revenues were distributed amongst the seven transportation programs.
- **Refine and complete.** Funding amounts for state of good repair, projects, and programs were refined to respond to public and stakeholder input, and to ensure that funding levels match available revenues (for the financially constrained scenario), or estimated future new revenues (for the vision scenarios).

The next sections describe in more detail how the process worked, focusing on the capital project prioritization and funding process (Section 2), and the selection of programmatic funding levels (Section 3).

2 Capital Project Selection Process

2.1 | Overview

Major capital enhancement projects were selected for the SFTP based on whether they would cost-effectively support the SFTP goals and associated performance measures (as determined through a project prioritization process), and based on whether they met several policy criteria.

Table 1 lists the performance measures used in project prioritization.

Table 1 – Performance Measures In Support of SFTP Goals

SFTP Goal	Performance Measure
Economic competitiveness	Average motorized travel time per trip (travel time)
Livability	Share of trips made by walking, bicycling, and transit (modeshare)
A healthy environment	Greenhouse gas emissions (GHG)
World class infrastructure	Level of crowding on transit lines (crowding)

Projects were grouped into one of four tiers based on the cost effectiveness evaluation results. Projects in the highest Tier have the greatest beneficial contribution to the four SFTP goals relative to their costs. A project's tier was combined with other policy considerations to determine whether it should be included in the plan. The project evaluation process is discussed in more detail below.

2.2 | Project Identification and Initial Screening

Candidate projects evaluated for inclusion in the SFTP originated from several sources:

- Projects submitted as part of the joint regional and San Francisco call for projects associated with the Bay Area Metropolitan Transportation Commission's (MTC) Regional Transportation Plan (RTP) in February-March 2011, or as part of a second San Francisco call for projects for the SFTP only, administered by the Authority in September-October 2011. These submissions included projects submitted by the public and by local and regional agencies.
- Projects suggested by the public and agencies in response to outreach conducted by the Authority in August-October 2011 to collect input on transportation needs and priorities for the SFTP[2].
- Projects considered or recommended in recent transportation sector studies and plans (e.g., the SFMTA 20-year Capital Program, the Authority's Bi-County Transportation Study, the Mobility and Pricing Study, the City's Climate Action Plan, and others).
- Projects included in approved Area Plans and priority development areas.
- Projects included in the Proposition K Transportation Sales Tax Expenditure Plan.
- Project ideas developed in support of the SFTP analysis of aspirational scenarios.[3] These scenarios, developed in the first phase of the Plan update, tested packages of projects designed to achieve specific long term performance targets in each of the four Plan goal areas. Some of the top-performing projects identified in this analysis are evaluated for potential inclusion in the SFTP.
- Project ideas identified through the SFTP needs analyses, such as the SFTP Baseline Needs analysis and the Core Network Circulation Study needs analysis.

From this initial list, the SFTP team screened out twenty-seven projects considered not appropriate for inclusion in the project evaluation process. These included:

- Baseline projects. Baseline projects are those which are (1) under construction, (2) fully funded, or for which all funding for the project is committed, (3) are identified as a regional transit expansion priority in the RTP / Sustainable Communities Strategy, or (4) are included in the inter-related program of projects identified in the signed memorandum of understanding: High Speed Rail Early Investment Strategy for a Blended System on the Peninsula Corridor.
- Previously evaluated and rejected projects. Projects which have been previously evaluated and rejected through an alternatives analysis, environmental impact report / statement, feasibility study, or similar, are not included in this evaluation process.
- Non-transportation projects. For instance, policy changes are not evaluated using this methodology.
- An inventory of all project concepts considered as part of this evaluation process, including those ideas received but screened from further analysis, is provided as Appendix A.

In the original September 2012 analysis, "programmatic" improvements were excluded from the performance evaluation exercise. "Programmatic" project concepts include: (1) relatively low project

[2] A list of all agency-submitted projects is available upon request.
[3] For more detail on the Aspirational Scenarios, see Appendix B.

cost, e.g., <$10M; (2) project features, location, or other aspects of project description not sufficiently defined to allow a detailed evaluation; and (3) projects difficult to evaluate due to their small scale or incompatibility with available research and analytical tools. However, in response to stakeholder input received during Fall 2012 outreach, three programs (the Bicycle, Pedestrian, and Travel Demand Management) were evaluated alongside projects in the performance evaluation. This evaluation influenced the amount of programmatic funding devoted to these categories (see Section 3.0 for a description of how programmatic funding levels were set).

2.3 | Project Evaluation Methodology

This section describes the project evaluation methodology, which involved scoring each project based on its likely contribution to Plan goals (benefit score), and dividing this score by the project's annualized cost to produce a proxy benefit-cost index. Projects were grouped into performance Tiers based on this index. The following sections describe each step in the evaluation process.

BENEFIT SCORE CALCULATION: The "benefit" score for each project was intended to capture how well the project contributes to positive outcomes in each of the four Plan goal areas (economic competitiveness, livability, healthy environment, and world-class infrastructure). Correspondingly, the benefit score included each project's contribution to change in travel times, mode shares, GHG emissions, and crowding.

A project's score for each of these four performance measures – GHG emissions, travel time[4], modeshare, and crowding - was the product of three sub-scores. These sub-components of the "benefit" score are depicted in Figure 3, and include a market sub-score, problem sub-score, and effect sub-score. These capture the magnitude and significance of a project's effect on each performance measure.

- Market sub-score (ranging from 1-3). The market sub-score reflects the number of travel markets potentially affected by the project; in other words, how many trips will the project affect?
- Problem sub-score (ranging from 1-3). The problem sub-score reflects the degree to which the main travel market served by the project has existing or expected future transportation performance deficiencies in the Plan goal areas: high levels of greenhouse gases, high automobile dependence, increasing travel delay, or high levels of transit crowding. In other words, how severe is transit crowding, GHG emissions, and so on in the travel markets that the project would serve?
- Effect sub-score (ranging from -1 to 2). The effect sub-score reflects the degree to which the project would improve transportation performance in each of the goal areas. In other words, how much would the project affect GHG emissions, transit crowding, and so on.

[4] For the bicycle and pedestrian programmatic project evaluation, the motorized travel time metric was replaced with safety, as safety was judged a more appropriate metric for these program types.

Figure 3 – Project Benefit Score Components

Metric	Market Score		Problem Score		Effect Score		Total Score
Greenhouse Gas (GHG)	1 to 3	×	1 to 3	×	-1 to 2	=	GHG Score
Motorized Travel Time	1 to 3	×	1 to 3	×	-1 to 2	=	Travel Time Score
Non-Auto Mode Share	1 to 3	×	1 to 3	×	-1 to 2	=	Mode Share Score
Transit Crowding	1 to 3	×	1 to 3	×	-1 to 2	=	Crowding Score
Total							Project Benefit Score

The method for calculating the scores is discussed below.

Market Sub-Score: The number of travel markets served by a project determined the project's market score. A project could serve one or more of 21 Bay Area districts, including 12 within the city of San Francisco, eight representing the other counties in the Bay Area, and an additional district representing all locations outside the nine-county Bay Area region. Together these districts comprise about 200 unique origin-destination pairs (for example, Alameda County to the South of Market), referred to as travel markets. A project's market sub-score was based on the number of primary travel markets it would potentially serve.

Problem Sub-Score: The Problem sub-score captured the severity of transportation needs in the primary travel market served by the project. The severity / degree of transportation need for any given travel market is determined for each of the four Plan goal-area performance measures (GHG emissions, modeshare, travel time, and crowding) using the Authority's travel demand model (SF-CHAMP) estimates of two analysis years: the existing (2010) and future 2035 Baseline Scenarios. The Problem Sub-Scores for each goal area range from 1 to 3, where 1 indicates the least severe problem and 3 indicates the highest severity problem for each metric. For most metrics, the scoring thresholds take into account both absolute future conditions and the degree of change from 2010 to 2035.

Effect Sub-Score: The Effect Sub-Score captured how well a potential project would improve transportation conditions in each of the four Plan goal-area performance metrics. A project's Effect Sub-score could range from -1 to 2 for each of the four metrics, where -1 indicates a negative effect and 2 indicates a strongly positive effect. For the majority of projects, the score is based on SF-CHAMP model results. Other effectiveness scores are based on research and some are informed by planner judgment.

Overall Project Benefit (Benefit Score): The market sub-score, problem sub-score, and effect sub-score for each of the performance measures is combined to produce a total, composite benefit score for each project.

PROJECT COST CALCULATION: The second component of each project's evaluation score was the project cost, including both the capital and incremental, new cost of each potential project. Incremental operating costs were only included for transit projects that would increase service levels. When available, cost estimates were obtained from project sponsors or existing plans and expressed in Year of Expenditure (YOE) dollars. For other projects, capital costs were estimated using the per-unit or per-mile cost of a similar reference project, and operating costs were estimated using modeled or sponsor-provided service plans and the average cost per revenue hour of service for each agency and transit mode.

Capital and operating costs for each project were converted to an average annual total cost to allow for comparing projects with different implementation timeframes and to avoid disadvantaging more expensive investments with longer lifecycles. The capital costs were annualized by dividing the total capital cost by the project's expected useful life. Then the annualized capital cost was added to the average incremental (new) operating cost to obtain the average total cost per year.

2.4 | Project Evaluation Results and Additional Considerations

The team calculated a final proxy benefit cost index for each project by dividing the project benefit score by the annualized project cost. This provides a dimensionless, proxy benefit-cost index illustrating the project's cost-effectiveness relative to other scored projects.[5]

Projects were grouped into four Tiers based on the proxy benefit-cost index. Although the proxy benefit-cost index was the main basis for a project's Tier grouping, overall project benefit was also considered. The High project tier includes projects with a proxy benefit-cost index greater than 2.5 *and* a Benefit score in the top third of all projects (these high-benefit projects are marked with an asterisk in the tables).

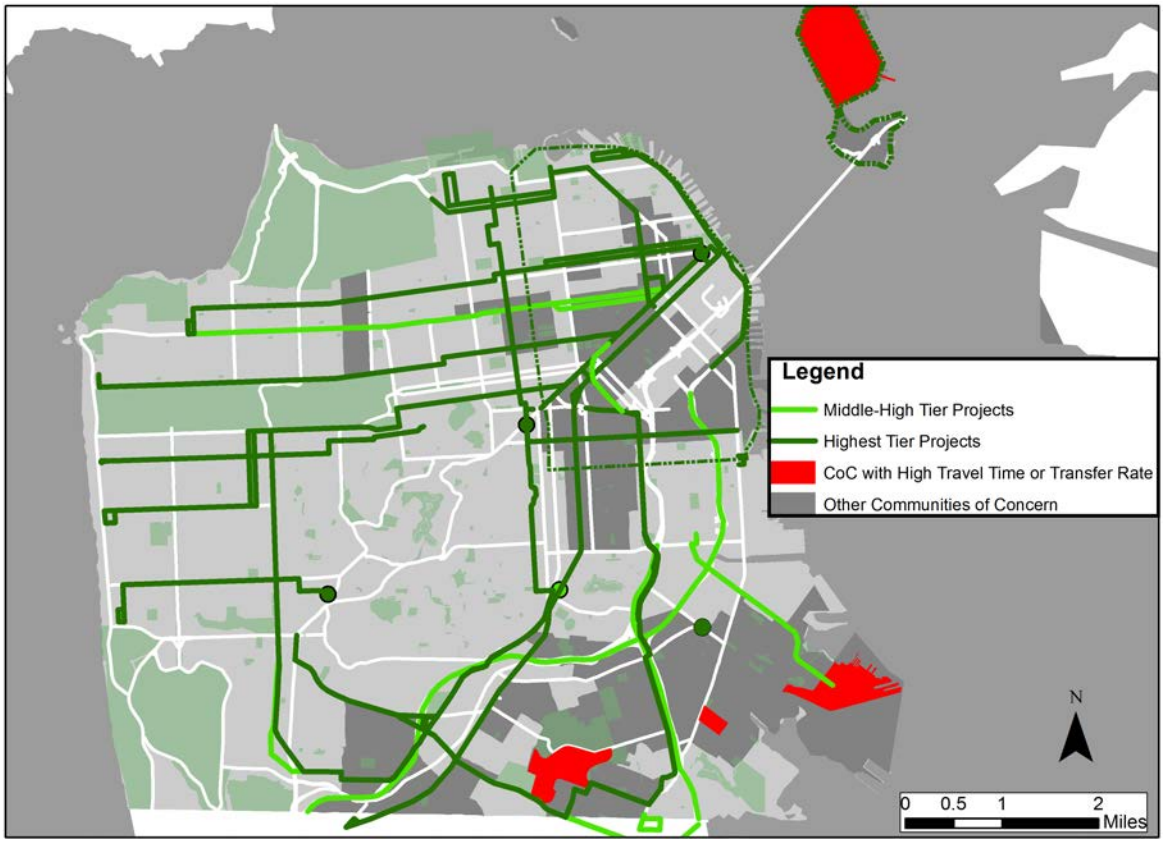
ADDITIONAL CONSIDERATIONS: A project's proxy benefit-cost Tier was not the sole consideration for including a project in the Preferred or Vision Scenario of the SFTP. Several other policy priorities were also considered. These include a project's contribution to:

- Safety. Projects are considered to provide a safety benefit if they would address life-safety risks such as emergency response.
- Operational Benefits. Projects are considered to provide an operational benefit if they would improve the ability manage services for reliability, such as by providing operational flexibility or reducing delays in deploying services.
- Support for growth in a Priority Development Area (PDA). Projects are considered to support PDA growth if they provide additional access routes, transit frequency, or capacity to a designated PDA. Appendix B provides a map of San Francisco's PDAs.
- Equity. Projects that support the equity consideration are defined here as those that enhance access to Communities of Concern (COC). Figure 4 illustrates how the middle-high and highest-tier projects overlap with designated communities of concern. A comprehensive equity

[5] Unlike a standard benefit-cost ratio, which compares the monetary value of project benefits to costs, the index cannot be used to determine if the project is economically justified (e.g. benefits exceed costs), and cannot be used to compare projects outside the context of the SFTP, since the benefit scores are based on relative comparisons within the group of scored projects.

analysis was used to determine whether the projects would improve conditions in these communities.

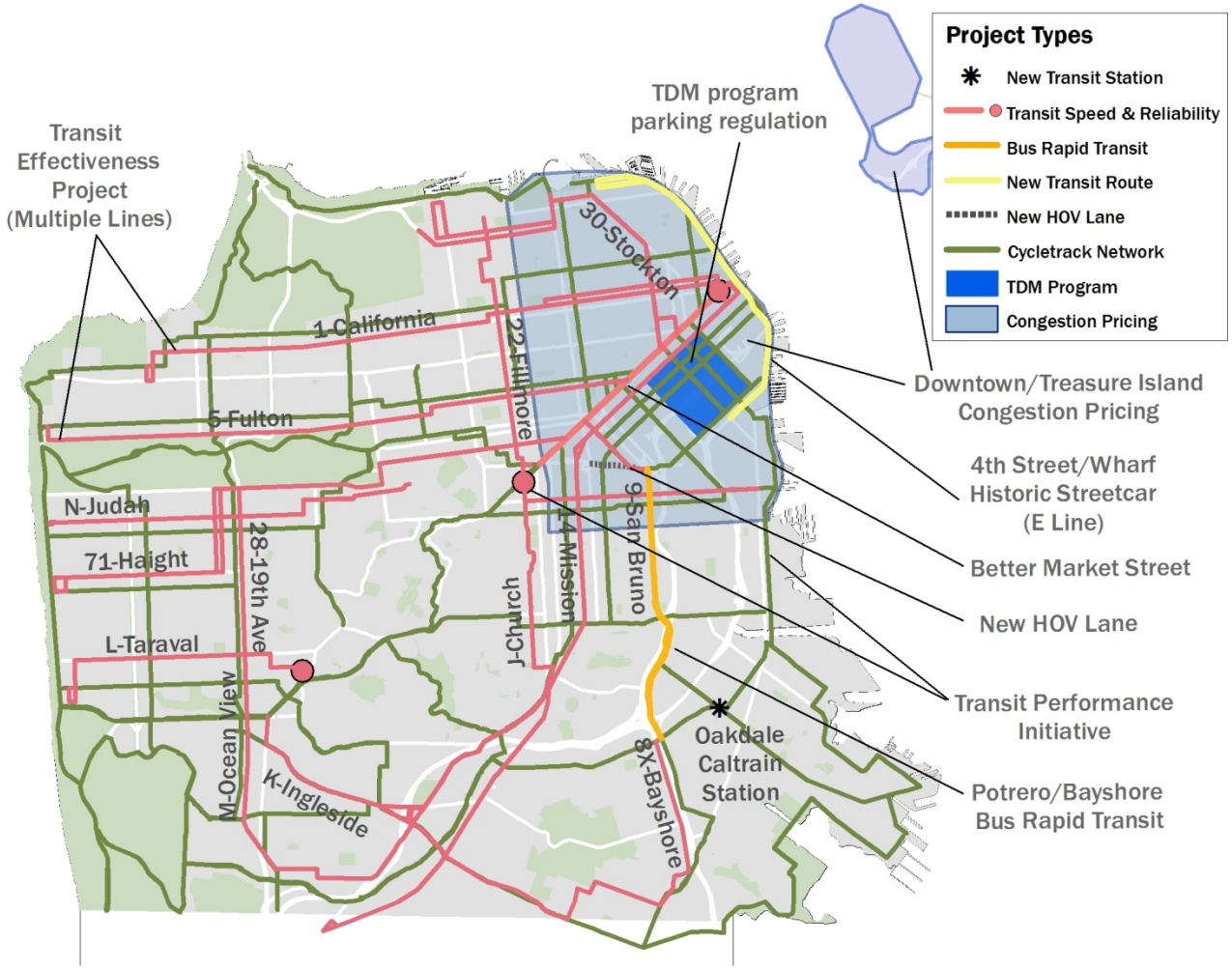
Figure 4 – Highest and Middle-High Tier Projects – Relationship to Communities of Concern



Figures 5 through 8 and Tables 2 through 5 show the projects included in each Tier, along with applicable additional considerations for each project.

HIGHEST TIER: The highest Tier of projects includes those with widespread benefits, such as the Congestion Pricing Pilot Program, Bicycle Program, and the Transit Effectiveness Project, as well as relatively low-cost targeted improvements such as a new Caltrain Station at Oakdale Avenue or a conversion of existing lanes to create HOV lanes on the Central Freeway.

Figure 5 – Highest-Tier Projects



**Note: Bicycle and Travel Demand Management programs are not shown.*

Table 2. Highest Tier Projects

Project Tiers Projects shown with an * are in the top third of Benefit scores.	Additional Considerations[15]			
	Safety Benefit	**Operating Benefit**	**PDA-Supportive[16]**	**Equity Benefit[17]**
Highest Tier - Benefit Cost Index > 2.5 and Overall Benefit in Top Third; or, Benefit Cost Index > 4				
Better Market Street* ($258M)[18] Re-design and improve Market Street for transit, bicycling, and pedestrians between Steuart Street and Octavia Boulevard.	✓		✓	
Bicycle Program* ($252M) Provide a citywide network of cycletracks similar to Oak/Fell improvements, bicycle education programs, a bike sharing system downtown, and bicycle parking citywide.	✓		✓	✓
Congestion Pricing - Cordon and Treasure Island* ($119M) Install a peak hour congestion charge for cars entering or leaving downtown or Treasure Island, and invest net revenues in transit improvements and other multi-modal investments. (This project generates revenue that would be used to fund its implementation and related improvements)			✓	
Historic Streetcar Expansion Program - E turnaround* ($149M) Provide a turnaround to enable direct historic streetcar service between Fisherman's Wharf and the 4th Street Caltrain station			✓	
HOV lane on the Central Freeway ($15M) Convert an existing travel lane into a carpool lane in each direction between I-80 and the South Van Ness/Mission off-ramps.				
New Caltrain Station at Oakdale Avenue ($62M)			✓	✓
Potrero / Bayshore Bus Rapid Transit ($128M) Provide rail-like transit service by installing dedicated bus lanes and other transit priority treatments on Potrero and Bayshore.			✓	✓
Transit Effectiveness Project* ($178 million) Improve Muni reliability and reduce travel times systemwide through stop infrastructure, lane modifications, stop controls and placement, and other transit preferential measures			✓	✓
Transit Performance Initiative* ($400M+) Provide one or more major capital investments to improve transit travel times and reliability at key bottlenecks, such as the Embarcadero Muni Metro turnaround, Mission Bay Loop, J-Church and N-Judah merge point, and at West Portal.		✓	✓	
Travel Demand Management Program* ($73M) Implement the TDM Partnership Project (Muni Partners Project and pilot TDM projects with institutions citywide), and continue TDM programs such as Emergency Ride Home.	✓		✓	✓
Sub-Total Cost, Top Tier	**$1,634M**			

[15] Additional considerations are project benefits that are not captured in the quantitative Benefit-Cost proxy analysis. Projects in lower Tiers may be considered for inclusion in the SFTP if they would address these additional considerations.

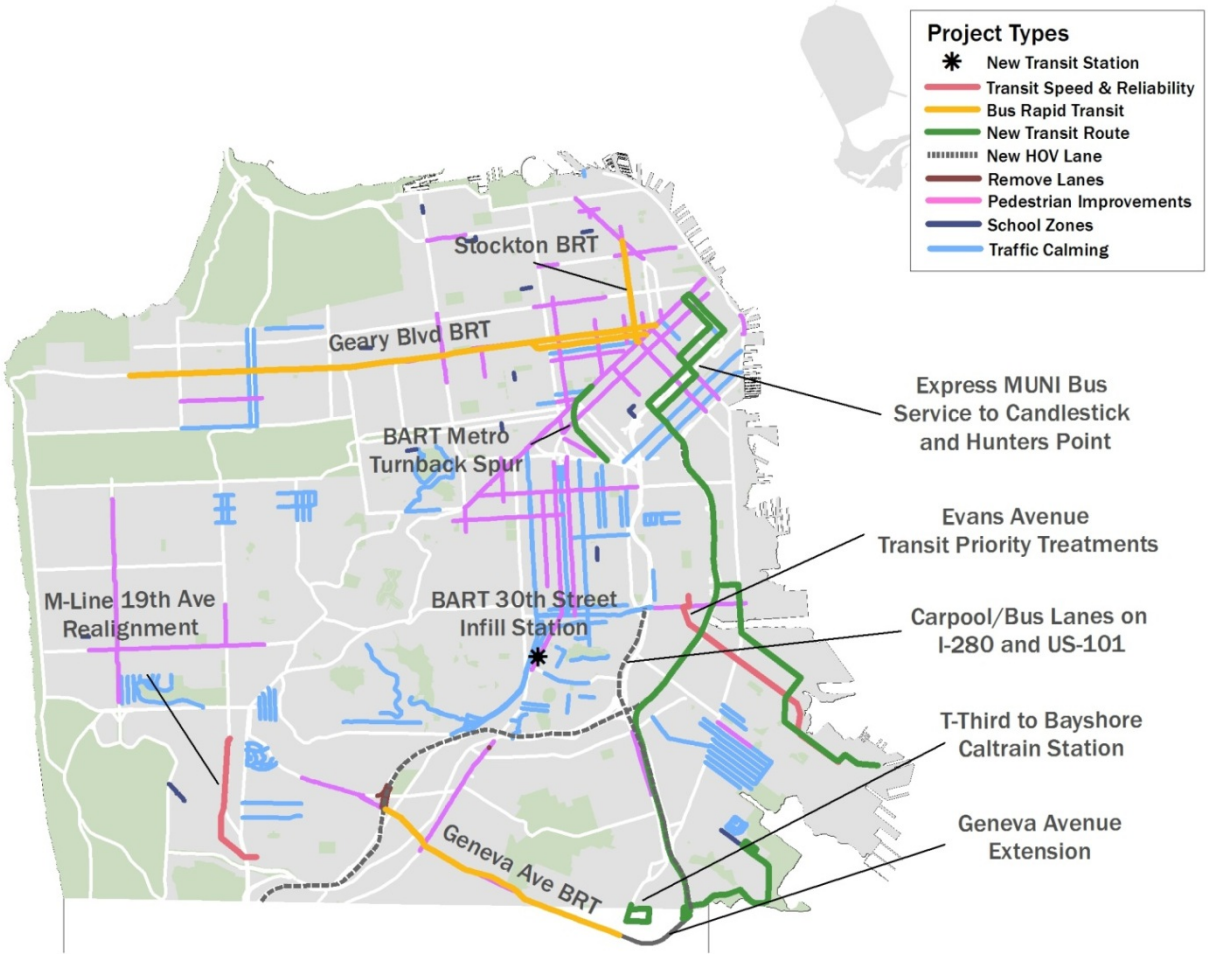
[16] Project is located in one of San Francisco's Priority Development Areas (PDAs).

[17] Project is located in one of San Francisco's Communities of Concern.

[18] Costs shown are capital cost plus the incremental (new) operating cost for transit projects, where applicable.

MIDDLE-HIGH TIER: The middle-high Tier includes twelve projects totaling approximately $3 billion. These projects tend to have low to moderate costs and high benefits but serve a limited set of travel markets. They include focused transit capital improvements such as line extensions, transit priority treatments, and bus rapid transit projects.

Figure 6 – Middle-High Tier projects



**Note: Pedestrian and Traffic Calming programs are not shown.*

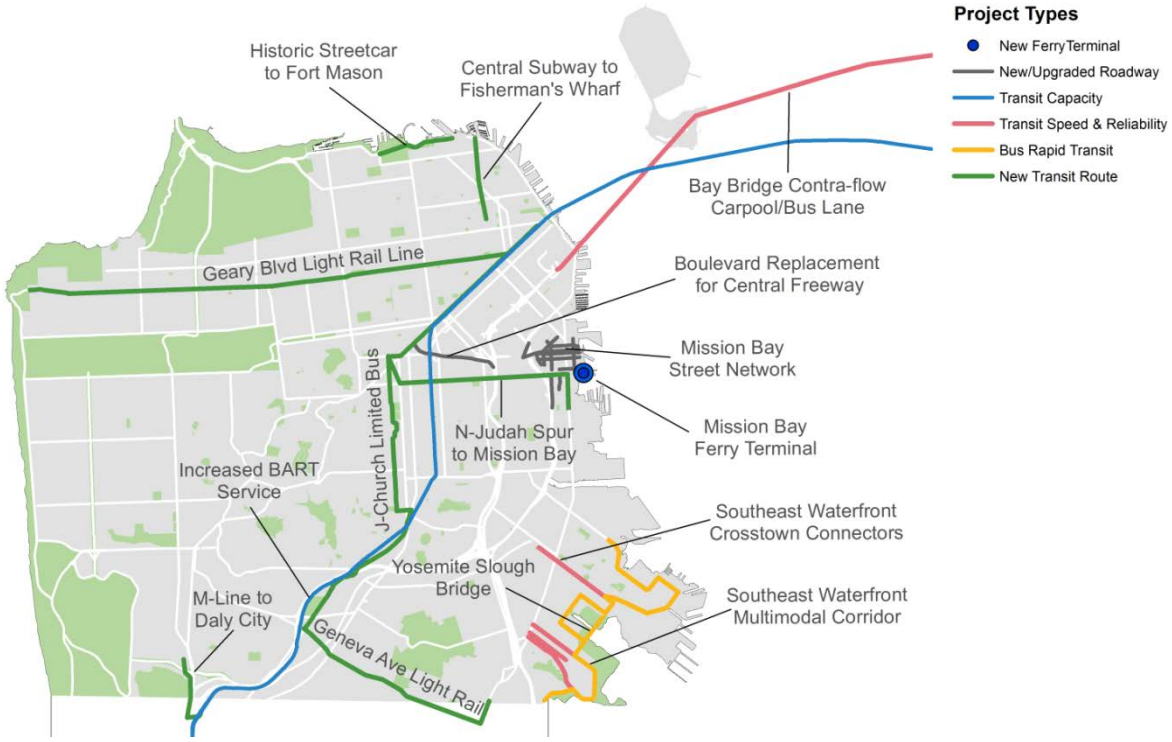
Table 3. Middle-High Tier Projects

Project Tiers Projects shown with an * are in the top third of Benefit scores.	Additional Considerations			
	Safety Benefit	**Operating Benefit**	**PDA-Supportive**	**Equity Benefit**
Middle-High Tier – Benefit Cost Index > 1.5, < 4				
BART Metro Turnback* ($500M) Construct a track extension allowing BART trains from the East Bay to turn around in San Francisco, and provide additional improvements that allow BART to run more frequent transbay service to the core of San Francisco.		✓	✓	
BART 30th St. Infill Station ($813M) Construct a new BART station between the 24th Street and Glen Park stations.			✓	
Carpool/bus lanes on I-280 and Highway 101 (to Cesar Chavez) ($148M) Convert an existing travel lane into a carpool/bus lane on I-280 from the county line to 6th Street and on Highway 101 from the county line to Cesar Chavez Street.			✓	
Evans Avenue transit priority treatments* ($71M) Provide a dedicated transit lane with signal priority from Highway 101 to Hunters Point.			✓	✓
Stockton Transit Priority and Partial Bus Rapid Transit ($35M) Improve reliability and reduce travel times for Stockton Street buses by providing transit priority treatments between between Market and Columbus, and a separated bus lane on Stockton Street between Bush and Market.			✓	✓
Express bus service from Hunters Point and Candlestick Point to downtown ($147M)			✓	✓
Geary Boulevard BRT ($229M) Construct rail-ready bus rapid transit (BRT) on Geary Boulevard from downtown to the ocean.			✓	
Geneva Avenue Extension ($148M) Extend Geneva Avenue from Bayshore Boulevard to Harney Way, under or over Highway 101, to provide access to new development at Hunters Point and Candlestick Point.			✓	
Geneva TPS/BRT ($92M) Install BRT, in dedicated lanes, from Bayshore Boulevard to Prague Street; and provide transit-preferential treatments in mixed-traffic lanes from Prague to Ocean Avenue/Balboa BART station.			✓	✓
M-line 19th Avenue west-side alignment ($271M) Construct a west-side alignment and grade separation to improve travel times and reliability on the Muni Metro M line.	✓		✓	
Pedestrian and Traffic Calming Program ($357M) Implement MTA's revised traffic calming program, including arterial traffic calming; provide pedestrian safety improvements citywide, including signals, bulb outs, and other pedestrian safety enhancement	✓		✓	✓
T-line extension to Southern Intermodal Terminal* ($152M) Extend the T-Third Street line from Bayshore/Sunnydale to the Bayshore Caltrain station.			✓	✓
Subtotal Cost, Middle-High Tier	**$2,963M**			

MIDDLE-LOW TIER: The low-middle Tier includes sixteen projects totaling approximately $9.4 billion (excluding the second BART tube, which could cost as much as $15 billion). This Tier includes several high-benefit but high-cost transit capital and operating projects. For instance, this Tier includes a $15 billion dollar project to build a second transbay BART tube to accommodate expected growth in BART ridership. In this case, the project would provide significant benefits, but has a very high capital and operating cost.

Other projects in this Tier with high benefit but relatively high costs include the Muni Service Expansion to Accommodate Growth, the Southeast Waterfront transit priority and expanded service, and the BART Rail Vehicle Capacity Expansion. Several of these projects, such as the Muni Service Expansion to Accommodate Growth, also address non-modeled other considerations, such as equity benefits and service to PDAs. The performance result in the Low-Middle Tier is generally the result of significant capital and/or operating costs for these projects rather than low benefit.

Figure 7 – Middle-Low Tier projects



**Note: Muni Service Expansion to Accommodate Growth and a new BART tube are in Middle-Low Tier but are not shown.*

Table 4. Middle-Low Tier Projects

Project Tiers Projects shown with an * are in the top third of Benefit scores.	Additional Considerations			
	Safety Benefit	**Operating Benefit**	**PDA-Supportive**	**Equity Benefit**
Middle-Low Tier (Benefit Cost Index > 0, < 1.5)				
BART expansion: Additional Transbay Tube* ($15,000M)			✓	
Bridge over Yosemite Slough ($69M) Four-lane bridge to connect planned new neighborhoods in the former Hunters Point Naval Shipyard to Candlestick Point.			✓	✓
Central Freeway removal/Octavia Boulevard Extension ($226M)				
Central Subway extension to North Beach and Fisherman's Wharf* ($1,686M)				
Contra-flow carpool lane on the Bay Bridge* ($335 million) Convert an existing travel lane on the Bay Bridge in the off-peak direction into a lane for AC Transit buses and carpools, with direct access to the Transbay Terminal.			✓	
Extend M-Line to Daly City ($377M) Extend the Muni Metro M-line from ParkMerced to the Daly City BART station, using dedicated transit lanes.			✓	
Geary Surface Rail* ($1,430M) [NOTE: assumes subway alignment east of Van Ness]			✓	
Geneva Avenue light-rail line* ($440M) Extend rail service along Geneva Avenue (either the T-Third Street line to the Balboa Park BART station or the J-Church to the Bayshore Caltrain station).		✓	✓	✓
Harney Way rebuild and BRT * ($445M) Rebuild Harney Way with 2 mixed traffic lanes, BRT, bike lanes and sidewalks to better connect new development at Candlestick Point to the Bayshore Caltrain station.			✓	✓
Increased BART service in San Francisco ($702M) Purchase 225 cars and operate additional service to accommodate expected increases in ridership.			✓	
Mission Bay ferry terminal ($75M) Construct a new ferry terminal at the end of 16th Street and operate ferry service between the east bay and the Mission Bay and Central Waterfront neighborhoods.			✓	
Muni Service Expansion to Accommodate Growth* ($2,000M)		✓	✓	✓
N-Judah spur to Mission Bay, along 16th Street ($619M) Build a new segment of Muni-rail track along 16th Street to provide direct N-Judah service between the Sunset and Mission Bay.		✓	✓	✓
Southeast Waterfront transit priority and increased service ($876M) Implement transit priority treatments, such as signal priority, on key east-west streets in Bayview/Hunters Point, and purchase new buses and rail vehicles for the T-Third Muni Metro line. Operate expanded Muni bus and T-Third service on these routes to accommodate new growth in residents and jobs in Candlestick Point and Hunters Point.			✓	✓
Historic Streetcar Expansion Program – Fort Mason Extension ($93M)				
J-Church limited bus ($45M) Provide Limited-stop bus service paralleling the J-Church line during peak hours.				
Subtotal Cost, Middle-Low Tier (excluding BART tube)	**$9,418M**			

LOWEST TIER: The lowest Tier of projects includes those not expected to provide measurable greenhouse gas-reduction, travel time, modeshare, or crowding benefits beyond baseline future conditions, and therefore have a proxy benefit/cost index score of zero. Four projects totaling approximately $369 million fall into this category. For example, the Cable Car Extension to Japantown would serve a portion of a corridor with adequate existing transit capacity, so would not relieve corridor crowding or other performance problems. However, some of these projects may still be considered for inclusion in the SFTP if they have benefits not fully captured by the evaluation process. For example, the 14-Mission Trolleybus Extension to Daly City would serve Communities of Concern and help improve reliability of the connection to the Daly City BART Station.

Figure 8 – Lowest Tier projects

Table 5. Low Tier Projects

Project Tiers Projects shown with an * are in the top third of Benefit scores.	Additional Considerations			
	Safety Benefit	**Operating Benefit**	**PDA-Supportive**	**Equity Benefit**
Lowest Tier (Benefit Cost Index = 0)				
14-Mission trolleybus extension to Daly City ($39M)		✓	✓	✓
Cable Car Extension to Japantown ($123M)			✓	
Candlestick Park Ferry ($83M)			✓	
Replace L surface rail with BRT ($124M)				
Subtotal Cost, Lowest Tier	**$369M**			

These project performance assessment results provided a starting point for designing the SFTP investment plan. Projects were ultimately included in the plan based not only on their evaluation Tier but also the additional policy considerations, available project-specific funding/leveraging, public input, and other factors, as detailed below.

2.5 Selecting projects for inclusion in the plan

Projects were selected for inclusion in the plan based on an inclusion score. The score was as a sum of the following components:

- **Project Performance (point range 1-4):** Projects received points based on their project performance tier (e.g. highest-tier projects received maximum number of points).
- **Operating Benefit (0-1):** Projects received a score of one if they would provide a transit operating benefit. This was included because the project performance analysis did not account for the fact that some projects (for example, the Transit Effectiveness Project) would improve transit efficiency and thereby reduce transit operating costs per unit of service provided.
- **PDA-Supportive (0-1):** Projects that serve a priority development area (PDA) received one point. Investment in these areas supports efficient transportation system usage by focusing new transportation facilities in areas where new development is expected to concentrate.
- **Previous Plan Inclusion (0-1):** Projects included in the Prop K expenditure plan or in a developer agreement received one point. Inclusion in these plans indicates a strong track record of community support for the project.
- **Equity (0-6):** Projects received an equity score based on a comprehensive community equity analysis presented at the April and May 2013 Community and Technical Advisory Committee meetings respectively (meeting materials are available upon request). Supervisorial districts were evaluated to determine which experience worse (e.g. inequitable) transportation conditions than the city-wide average in the areas of safety, transportation network quality, and transportation system performance. Projects with potential to improve these conditions in under-performing districts received a higher equity score.

A project was included in the financially constrained scenario if it:

- Scored in the high or middle high performance tier;
- Had a project inclusion score was greater than the average project inclusion score for all scored projects; and
- Leverages a significant non Prop K funding source.

A project was included in the vision scenario if it:

- Scored in the high or middle-high tier; and
- Had a project inclusion score in the top two-thirds of all project inclusion scores.

Not all included projects were fully funded. Some high cost projects, such as the M-Line realignment, were partially funded. Table 6. below lists all projects included in the financially constrained and vision scenarios.

Table 6. Projects Included in the Plan and Vision Scenarios

Efficiency and Expansion Projects		Plan	Vision
Long-Range Transit Network Development, including Transit Performance Initiative (TPI)	Partially funded. Includes planning and implementation for TPI, rapid bus, and/or Muni Metro upgrades.	$0.10	$1.50
Expanded Transit Service and New Vehicles: Muni + Regional Operators	Partially funds expansion of transit services	$0.41	$0.71
BART Metro	Partially funded in vision only	$0.00	$0.50
M-Line West Side Alignment + Grade Separation	Partially funded; fully funded in vision	$0.12	$0.43
Better Market Street (transportation elements only)	Partially funded; fully funded in vision	$0.20	$0.39
Transit Effectiveness Project	Fully funds project	$0.34	$0.34
Geary Bus Rapid Transit	Fully funds project	$0.28	$0.28
Bayshore / Potrero Bus Rapid Transit	Fully funds project	$0.13	$0.13
Freeway Performance Initiative (FPI)	Partially funded; fully funded in vision	$0.04	$0.13
Bi-County Program (T-Third Street Light Rail to Caltrain Bayshore Station and Geneva Harney Bus Rapid Transit)	Fully funds project	$0.09	$0.09
Oakdale Caltrain Station	Fully funds project	$0.05	$0.05
Waterfront transit capacity and performance, e.g., E-Historic Streetcar Service between Fisherman's Wharf and the 4th Street Caltrain Station	Fully funds project	$0.05	$0.05
Express Bus Service from Candlestick and Hunters Point	Fully funds project	$0.03	$0.03
Congestion Pricing: Northeast Cordon and Treasure Island, Capital Start-up	Fully funds project	$0.03	$0.03
Congestion Pricing: Northeast Cordon and Treasure Island, Ongoing Operations and Multimodal Capital Investments		N/A[1]	
Southeast Waterfront Transit Priority and Increased Service	Southeast Waterfront improvements proposed to be funded by future growth in the General Fund resulting from development	N/A[2]	
	(amount in $billions YOE)	**$1.88**	**$4.67**
	Share of Plan Funding	**2%**	**6%**

Notes:

1 The congestion pricing program raises approximately $2.5 Billion in revenue that is invested into supportive multimodal projects and programs.

2 Southeast Waterfront improvements proposed to be funded by future growth in the General Fund resulting from development.

Also note that both scenarios include full funding for previously committed projects, including Transbay Transit Center Phase 2/Caltrain Downtown Extension; Presidio Parkway; Transbay Transit Center Phase 1; Central Subway; Developer Funded Projects (Parkmerced, Mission Bay, Treasure Island, SE Waterfront Local Streets); Caltrain Electrification/Signal System (SF share of total cost); Van Ness Avenue Bus Rapid Transit; and the Yerba Buena Island Ramp Improvements.

2.6 | Agency and Public Input into the Evaluation Process

The evaluation methodology and results incorporate input from Technical Advisory Committee (TAC) and Community Advisory Committee (CAC) members and the public. The Authority conducted outreach to agencies and the public during each call for projects to identify and refine the universe of projects to be evaluated for consideration in the SFTP.

The analysis team presented the draft evaluation methodology to the SFTP TAC and CAC and adjusted the scoring methodology in response to input received. For instance, an initial methodology was modified in response to concerns that it gave too much priority to the needs of rapidly developing areas of the City; this was changed to consider existing and future transportation needs equally. The team also conducted a sensitivity test on the Market problem sub-scores to test the effect of implementing non-Baseline, development-related projects on the problem sub-scores. The team also adjusted the Market problem scores to incorporate both absolute future needs and forecasted change over time. Perhaps the most substantive change to the analysis involved adapting the methodology to incorporate the bicycle, pedestrian / traffic calming, and TDM programs, in response to stakeholder input. Finally, the team conducted a gap analysis to ensure that all of the travel markets with the greatest transportation needs and potential for cost-effective improvement had projects intended to address those issues included in the list of projects evaluated. Additional detail on SFTP outreach and its impact on plan recommendations is available in SFTP Appendix D: Outreach Summary.

3 Programmatic Funding Levels

3.1 | Overview

The capital project ranking process described previously applied only to a small share of plan investments (about 3 percent of the revenues in the financially constrained scenario). The majority (e.g. 84 percent) of SFTP funding goes to programmatic funding categories, including state of good repair / operations and maintenance and citywide programmatic enhancements (Table 8 lists these categories). Progammatic funding categories differ from capital projects in that they provide flexible funding that can fund any project that meets the criteria of the program. Specific projects can be called out for funding within programmatic categories, but those projects are not separately ranked.

Programmatic funding levels were set through a two-step process. The first step established a range of need in each programmatic category using two benchmarks:

- Projections of the funding that would be available if historic funding levels were continued over the life of the plan. This typically represented the low end of need. Historic funding projections were not available for all categories.
- Projections of the estimated future funding need by category (if available). These projections were based on an analysis of state of good repair needs and programmatic needs (see the Needs Analysis White Paper for detail), as well as the SFTP calls for projects, which produced lists of smaller-scale projects or groups of projects that will be funded through programmatic categories.

After establishing an appropriate funding range for each category, funding levels were selected using staff discretion informed by:

- Public outreach results indicating which types of investments are most desired by the public (see SFTP Plan Appendix D: Public Outreach Summary Findings); and
- Inter-agency dialogue. SFCTA staff met with numerous constituencies to collect their input on funding levels. Coordination with the ongoing Mayor's Transportation Task force was an important consideration.
- Results of program analysis, if applicable. As noted previously, in response to citizen request, three programs (travel demand management, walking/traffic calming, and bicycle) were submitted to an analysis similar to that undertaken to rank projects. The analysis showed all three programs performed well.

These inputs led to several guiding principles that informed final funding levels, listed in Table 7. Additionally, staff were sensitive to the need to balance amongst multiple competing priorities, such as maintaining versus expanding the transportation system; funding cost-effective programs while responding to public demand for popular investment types; and ensuring investments achieve geographic and socioeconomic equity. Table 8 lists the final funding levels for each program. Figures 9 and 10 compare these funding levels to historic funding and estimated total funding need (if available).

Table 7. Guiding Principles that Informed Programmatic Funding Levels

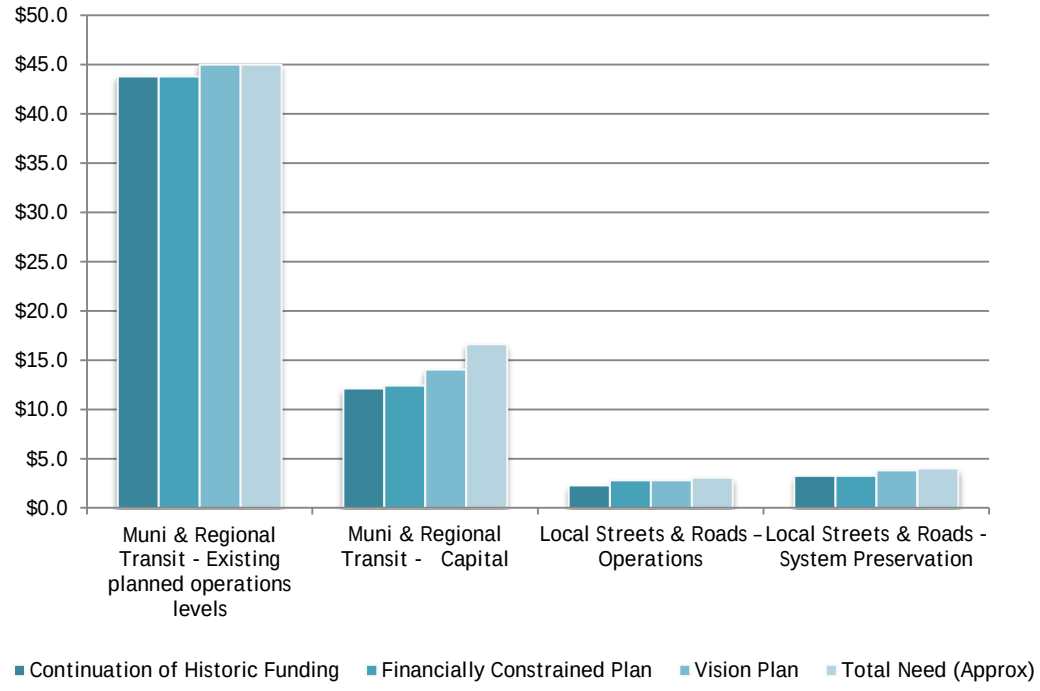
Guiding Principle	Influences
Fund at least 80 percent of the need for State of Good Repair needs	Full funding of state of good repair need is not possible within available revenue (e.g. SOGR needs exceed all available revenues); however, the largest share of funding was dedicated to this category, because public outreach indicated that, generally, the public would rather focus on maintaining existing infrastructure than new construction (See SFTP Appendix D: Outreach Summary).
Prioritize preservation and replacement of the most critical vehicles	Vehicle maintenance and replacement needs exceed available revenues. Funding the regionally-identified top-priority vehicle replacement needs was judged most important (these top-priority vehicles are referred to as "Score 16" vehicles). These include not just MUNI vehicles but vehicles from regional operators (BART, AC Transit) that San Francisco residents depend on. Full funding of vehicle mid-life overhauls was also a top-priority, as this will improve transit service reliability by reducing vehicle breakdowns, and will improve geographic equity by reducing unscheduled service turnbacks to outlying neighborhoods.
Prioritize funding for transit vehicle maintenance over operation	Public outreach results indicate that both transit frequency and reliability are top concerns, but also indicated that system maintenance is more important than expansion. Therefore, investments in transit vehicle maintenance, which will improve reliability, were prioritized above investments in expanding the frequency of transit service. The plan aimed to at least preserve existing transit frequencies while improving vehicle maintenance.
Significantly increase funding for bicycling and walking	Significant increases in funding for bicycling and walking infrastructure were included in the vision scenario, and to a lesser extent, the financially constrained scenario. This was based on public outreach results indicating that bicycling and walking infrastructure are top public priorities after transit (See Appendix D: Outreach Summary). Additionally, addressing pedestrian safety is a critical policy priority as indicated in the 2013 Mayor's Pedestrian Strategy; and increasing rates of bicycling commuting is another important priority (see the Needs Analysis White Paper).
Increase funding for travel demand management strategies above historic levels	Although the public did not rank investments in travel demand management strategies as high priority, staff felt that funding for these strategies should be increased due to their cost-effectiveness in reducing automobile congestion (see Need Analysis). Historically, funding for these strategies has been very low, so an increase over historic levels can be accomplished with minimal additional resources.
Increase funding for street/signal upgrade program	The calls for projects generated many projects involving street network and signal upgrade improvements. Staff significantly increased funding for this category in response.
Maintain or somewhat increase funding levels for programs of lesser priority.	Programs judged to be of lesser priority based on public outreach results and staff discretion included funding for MUNI enhancements (e.g. upgrades not associated with providing more service), and Regional Transit Enhancements (e.g. improvements to regional transit stations etc). the increase in the street network development program category was in response to the calls for projects, both agency and public responses.
Address geographic and funding equity	Supervisors and community members expressed a desire for SFTP funding to address socioeconomic and geographic disparities in the quality of transportation infrastructure. In response, a small amount of funding was set aside specifically to fund projects that would address inequities.

Table 8. Programmatic Funding Levels Selected for the Constrained and New Revenue Scenarios (Billions of Year of Expenditure Dollars 2013-2040).

Investment Category	Investment Level	Plan	Vision
State of Good Repair / Operations & Maintenance			
Muni & Regional Transit – Operations. Provides funding to operate MUNI and regional transit service.	Plan: Maintain today's funding and actual service levels. Vision: Fully fund all today's scheduled service levels.	$43.80	$45.00
Muni & Regional Transit - Capital Asset Maintenance. Provides funding to maintain and replace MUNI and regional transit vehicles, stations, and vehicle housing facilities.	Plan: Fully fund transit vehicle replacement needs for all operators; all MTA vehicle mid-life overhauls; and 70% of score 16 assets. Vision: fund additional Muni SOGR needs beyond Score 16.	$12.41	$14.06
Local Streets & Roads - System Preservation. Provides funding to re-pave streets and roads.	Plan: maintain today's pavement condition. Vision: Reach and maintain pavement condition index of 70.	$3.27	$3.83
Local Streets & Roads – Operations. Provides funding for street sweeping, signal maintenance, and other roadway upkeep.	Plan and vision: maintain today's levels of street operations.	$2.80	$2.80
Local Street & Bridges Structures - Capital Maintenance. Provides funding to maintain or replace aging structures (e.g. bridges and tunnels).	Fund umnet need of $3M/decade.	$0.01	$0.02
SUBTOTAL	**(amount in $billions YOE)**	$62.29	$65.71
	Share of SFTP Total Funding	**83%**	**79%**
Programs			
Walking and Traffic Calming. Supports new and widened sidewalk construction, sidewalk bulb outs to shorten crossing distances, crosswalk upgrades, pedestrian countdown signals, landscaping, and vehicle speed control treatments.	Plan: provides $10m/year (based on historic funding levels). Vision: funds full build out of the Mayor's Pedestrian Strategy.	$0.28	$0.63
Bicycling. Supports physical improvements on the citywide bicycle network, such as new cycle tracks (bike lanes physically separated from moving cars), bike lanes and paths, repair of existing lanes, bicycle parking, and bicycle outreach and education.	Plan: funds a citywide cycle track network. Vision: funds full buildout of the SFMTA Bicycle Strategy.	$0.15	$0.60
Regional Transit Enhancements. Supports improvements for regional transit operators serving San Francisco, including BART, Caltrain, and Golden Gate Transit, such as additional escalators at stations, new signage, and station access improvements (e.g. more bike parking).	Plan: maintain historic levels. Vision: increase moderately over historic levels.	$0.20	$0.35
Muni Enhancements and Customer First Treatments. Supports new Muni equipment to improve transit reliability and passenger amenities, such as on-vehicle cameras, ticket vending machines, and new station platform information displays, as well as new and improved transit stops.	Plan: maintain historic levels. Vision: increase moderately over historic levels.	$0.19	$0.29
Street and Signal Upgrades and Street Network Development. Supports new traffic signs and signals, red light photo enforcement equipment, management of major arterials such as Guerrero or Lincoln, and new streets in developing areas of the City such as Hunter's Point and Candlestick Point	Plan: doubles historic funding levels. Vision: triples historic funding levels.	$0.21	$0.28
Transportation Demand Management. Supports educational, outreach, and regulatory programs that reduce single-occupant vehicle use for commuters, schools and universities, and institutions.	Plan: increase of 20% over historic funding. Vision: doubles historic funding levels.	$0.06	$0.10
Equity. Supports planning and project development in Communities of Concern and citywide	Provides $10M/year for planning, operations, and/or implementation	$0.14	$0.28
SUBTOTAL	**(amount in $billions YOE)**	**$1.23**	**$2.53**

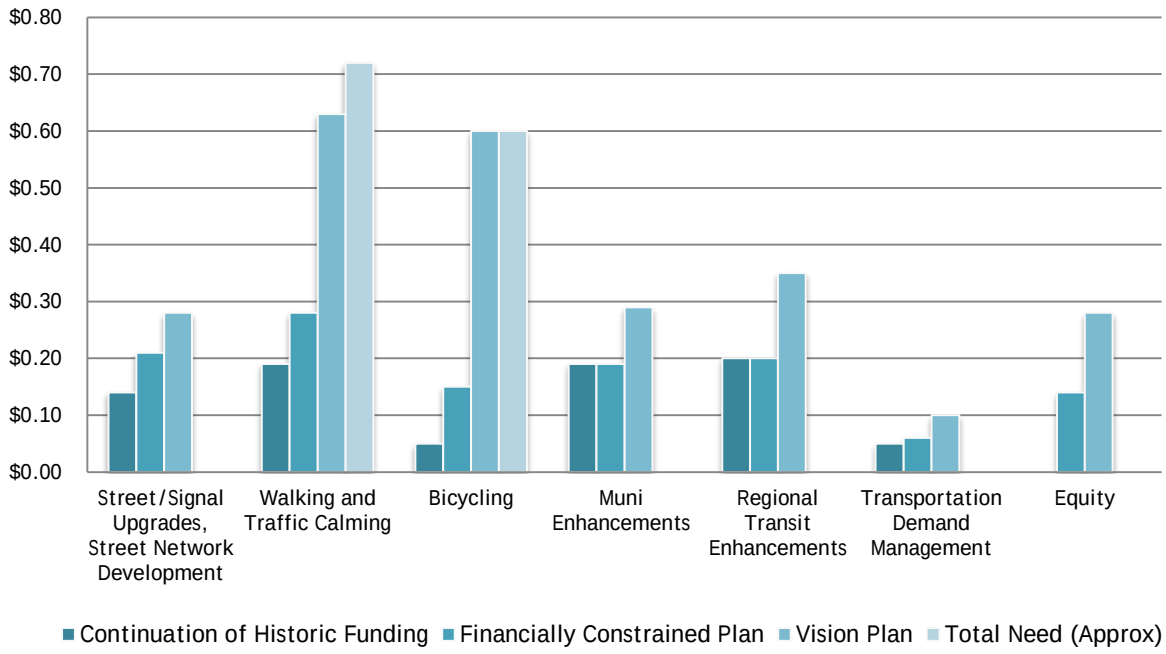
	2%	3%

Figure 9. Operations and Maintenance Plan Funding Levels in Comparison to Need



Note: All figures are in billions of year of expenditure dollars over the life of the plan (today through 2040)

Figure 10. Transportation Program Funding Levels in Comparison to Need



Note: All figures are in billions of year of expenditure dollars over the life of the plan (today through 2040).

Appendix B: White Paper

TRANSPORTATION NEEDS

KEY TOPICS

- The performance of San Francisco's transportation system, under both current and future (2040) baseline conditions
- Issues that need to be addressed to make progress towards the four major SFTP goal areas: world-class infrastructure; economic competitiveness; livability; and healthy environment
- "What it would take" to achieve San Francisco's ambitious goals in these four areas
- Issues and opportunities related to visitor and student travel and goods movement

1 Introduction

In 2040, San Francisco will host 200,000 new jobs and more than 250,000 additional residents, bringing its population over one million for the first time. Over the next 30 years, the city's transportation system will need to adjust to accommodate the trips made by these new residents and visitors. It will also need to confront the significant challenges it faces today, including years of underinvestment in system upkeep, escalating operating costs, challenges delivering new projects in advance of growth, an overcrowded transit system, and a road network that lacks capacity to absorb the projected growth in driving (even assuming the emerging innovations from the technology sector, including car- and ride-sharing and private commuter shuttles).

We analyzed these trends and their implications for San Francisco's transportation system to inform development of the San Francisco Transportation Plan (SFTP). This report describes the analysis in detail. It is organized in four sections corresponding to the four SFTP goal areas: world-class infrastructure, economic competitiveness, healthy environment, and livability, with a final section analyzing the transportation needs of specific groups of travelers – visitors, students, and companies making deliveries in the city. Specifically:

- **SECTION 2: ECONOMIC COMPETITIVENESS** describes projected housing and employment growth through 2040 and resulting roadway congestion and transit crowding. It shows how system expansion, especially in the downtown core, is needed to ensure new workers, visitors, and residents can be accommodated.

- **SECTION 3: WORLD-CLASS INFRASTRUCTURE** examines what will be required to maintain a state of good repair across our transit and roadway systems. It details the transit system performance impacts of capital asset maintenance deficiencies, identifies key transit systems' capital asset maintenance funding needs, and discusses the condition of the city's roads and bridges. Key needs include a large unfunded backlog of vehicle maintenance needs that will contribute to further declines in transit system reliability if not addressed.

- **SECTION 4: LIVABILITY** analyzes trends in bicycling and walking, especially safety, relative to San Francisco's goals for nonmotorized transportation and describes future investments needed to ensure the city can meet its goals for the share of trips made by bicycling and walking while ensuring safety.

- **SECTION 5: HEALTHY ENVIRONMENT** describes environmental goals for our transportation sector, including those stemming from SB 375 (which set greenhouse gas emission reduction targets for the Bay Area). It describes trends in GHG emissions and vehicle travel under current and future baseline "business as usual" conditions, and explains what it would take to achieve our ambitious environmental goals. The section identifies strategies such as congestion pricing and travel demand management that could help reduce existing vehicle traffic and greenhouse gases.

- **SECTION 6: VISITOR, GOODS MOVEMENT, AND SCHOOL TRANSPORTATION NEEDS** describes the transportation issues faced by these three groups, whose needs do not fit neatly into the sections above. This section discusses strategies to reduce visitors' reliance on private automobile travel to help reduce congestion. It describes the effects of increasing congestion on goods movement and proposes some ways to solve the problems. Then it presents information from a survey of students and their parents about factors that prevent them from taking transit, walking, or riding a bicycle to school.

  In addition to the analysis in these sections, we also assessed the performance of the future transportation system through the lens of geographic and socioeconomic equity (see SFTP Appendix F), and did a focused study of future conditions in the downtown core where transportation congestion and crowding are expected to be most acute (see SFTP Appendix C).

THE FUTURE BASELINE:
THE TRANSPORTATION SYSTEM OF THE FUTURE ASSUMING BUSINESS AS USUAL

Most of the quantitative transportation system performance measures in this document are generated by the SFCTA's travel demand model, SF CHAMP. To identify emerging needs, we compared performance today with performance in a 2040 future baseline scenario. The future baseline includes all projected housing and job growth as well as committed transportation improvements (See SFTP Appendix A for a definition of committed improvements) such as the Central Subway, the Van Ness Bus Rapid Transit, and the Presidio Parkway, among others. The future baseline represents conditions without any new investment beyond what is already committed, and illustrates performance gaps where additional investment is needed.

2 Economic Competitiveness

SECTION SUMMARY:

- San Francisco is planning for jobs and housing to each grow by 30 percent over the plan period.
- Crowding in transit vehicles and at popular transit stations will worsen without investments in new capacity, especially in the highest-growth areas such as the northeast core and southeast waterfront.
- Projected levels of new development will increase street congestion, particularly in the northeast core. Traffic forecasts predict that the city would need to reduce private-vehicle traffic by more than 25 percent to avoid peak-period gridlock in this area.
- Trip-making patterns will evolve with increased density along the eastern waterfront and in the city's southwest, suggesting a need for more investment in these areas.

This section describes the transportation performance indicators most closely related to economic competitiveness, the city's ability to continue drawing jobs and talent. Today, San Francisco is home to 11 percent of Bay Area residents and 17 percent of Bay Area jobs. While the city is projected to grow significantly over the plan period, the ability of San Francisco's transportation system to handle the trips of hundreds of thousands of new residents and workers will determine whether these projections can, in fact, become reality. This section analyzes key aspects of the transportation system and assesses what new investments will be necessary for it to handle forecast growth.

2.1 | Goals and Performance Measures

The SFTP economic competitiveness goal is to ensure the transportation system can accommodate new demands from a growing population and employment, and in doing so, ensure that Bay Area residents, employers, and visitors continue to want to live, work, and play here.

Key metrics associated with this goal are:

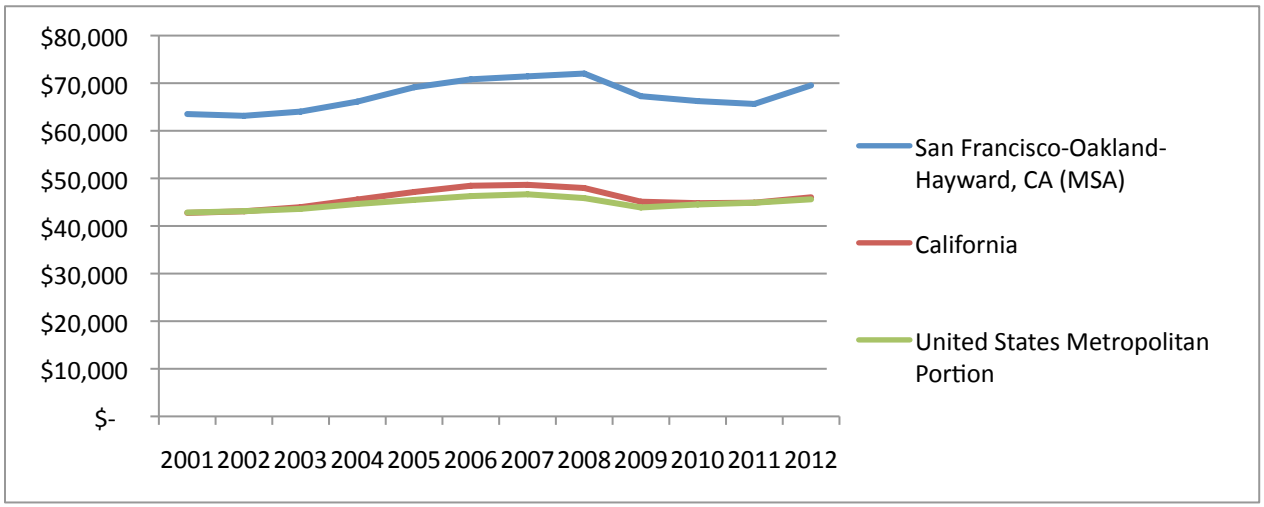
- Major changes in trip making patterns in growing markets
- Commute travel times
- Transit crowding (expressed as person-hours traveled in crowded conditions)
- Street congestion (expressed as percent of roadways experiencing congestion)
- Transit speeds

2.2 | Trends and future conditions

2.2.1 | OVERALL GROWTH TRENDS

San Francisco's economy has seen dramatic growth over the last two decades. As Figure 1 shows, even with the national downturns in 2001 and 2008, the per-capita gross domestic product of the metropolitan area centered on San Francisco outpaced both statewide and national economic productivity over the first decade of the 21st century. This robust economy has led to steady increases in real-estate demand, making San Francisco one of the most expensive places to live in the United States.[10]

Figure 1 Economic Productivity in Per Capita Private-Sector GDP, 2001-2012 (2005 dollars)

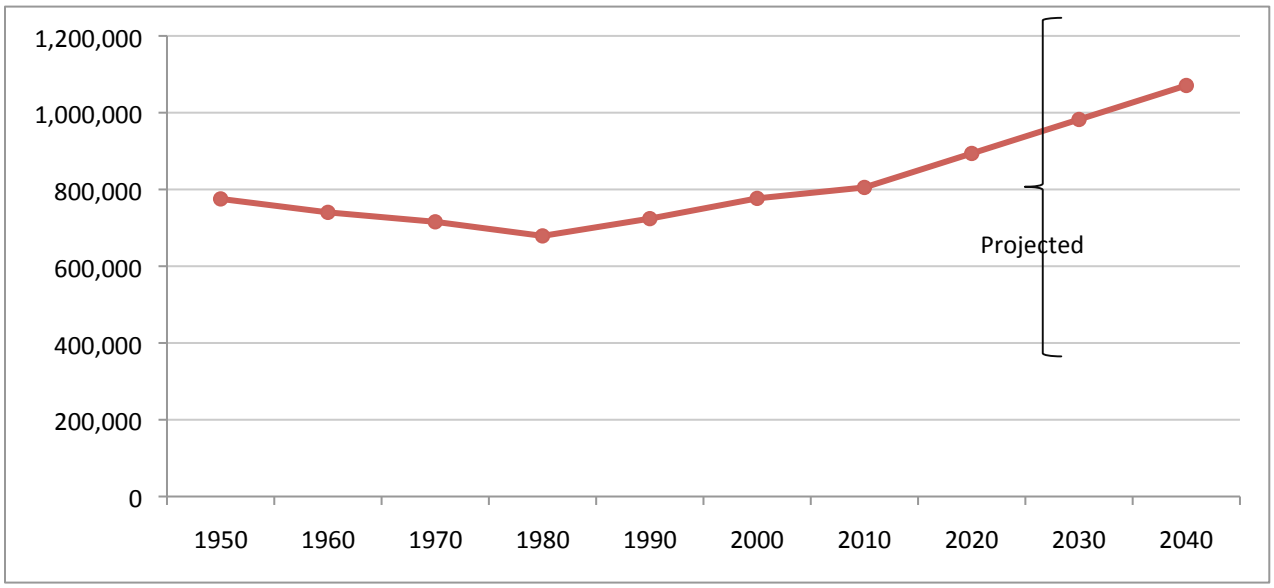


Source: United States Bureau of Economic Analysis. State and Regional Data, Per Capita Real GDP (Chained 2005 Dollars). Retrieved from www.bea.gov on 10/17/13.

Those economic dynamics, combined with state and regional policies aimed at encouraging development in areas that are already urbanized and transit-oriented (see Section 5 for more on these policies), are why the Association of Bay Area Governments has forecast significant job and housing growth in the city. A city of 800,000 residents and 570,000 jobs today is forecast to house nearly 1.1 million residents and more than 750,000 jobs by 2040.[11] This would be the fastest growth in population and jobs since the 1950s (see Figure 2).

[10] Bloomberg.com. "Most Expensive Housing Markets: U.S. Cities." Retrieved from http://www.bloomberg.com/visual-data/best-and-worst/most-expensive-housing-markets-us-cities on 10/7/13.
[11] United States Census Bureau. *American Community Survey*, 2011.

Figure 2 San Francisco: Historic Population Growth, 1850-2013



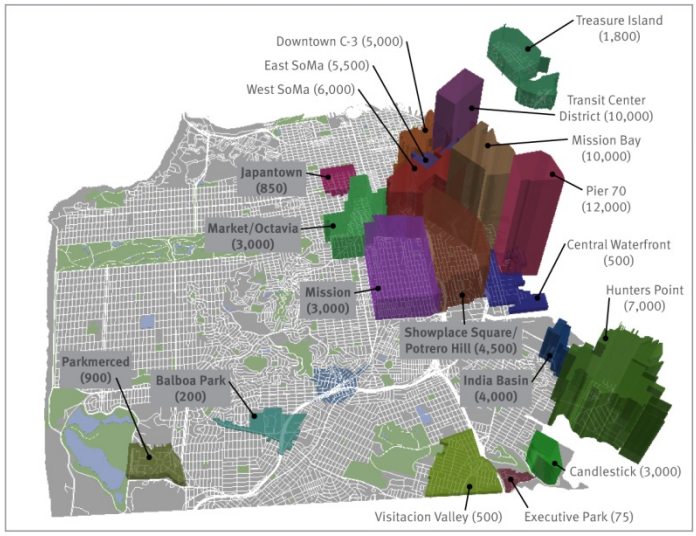
Source, 1950-2010: United States Census Bureau via Bay Area Census. San Francisco City and County Decennial Census Data. Retrieved from http://www.bayareacensus.ca.gov/counties/SanFranciscoCounty40.htm on 10/17/13. 2020-2040 estimated based on projected 2040 from the Association of Bay Area Governments.

The SF Planning Department is planning to accommodate much of the city's projected growth in the northeast core and along the eastern waterfront, both areas the city and region have identified as appropriate for densification given their central locations or access to transit (Figures 3 and 4). Major development projects like those in Mission Bay, Hunters Point/Candlestick Point, Treasure Island, the Schlage Lock site in Visitacion Valley, and Parkmerced will contribute a great deal to this projected growth, but smaller-site projects throughout the eastern third of the city will also house a significant portion of the planned growth.

Much of the new development will also be concentrated in SoMa, which already has significant new transit infrastructure that is already under construction. Two major Planning Department efforts demonstrate this focus. The Central Corridor Plan, for the area around the new Central Subway, includes zoning changes and increases in height limits for a 28-square-block area between Market, Townsend, 2nd, and 6th streets. The Transit Center District Plan, for the area around the new Transbay Terminal, also includes significant increases in zoned density and height limits, among other changes, for the area between Market, Folsom, Steuart, and 3rd streets. The Central Subway and the new Transbay Transit center will help accommodate some of this growth.

Figure 3 Projected Housing Growth by Neighborhood

Figure 4 Projected Job Growth by Neighborhood

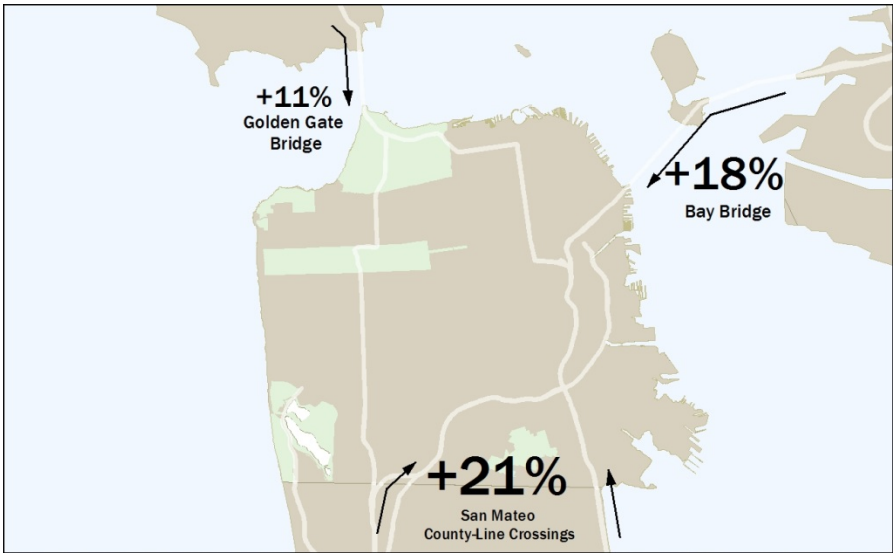


Source: SF Planning Department

The forecast growth in jobs and residents over the plan period is projected to lead to major increases in trip-making across all modes in San Francisco. The city is projected to see 600,000 daily new person-auto trips by 2040.[12] A portion of these new trips are forecast to come from outside the city, and as Figure 5 shows, the bridges and major San Mateo county line crossings are projected to see major increases in daily traffic volumes. However, almost three quarters of all daily auto trips to downtown are forecast to come from elsewhere in San Francisco.

[12] SF-CHAMP 4.3.

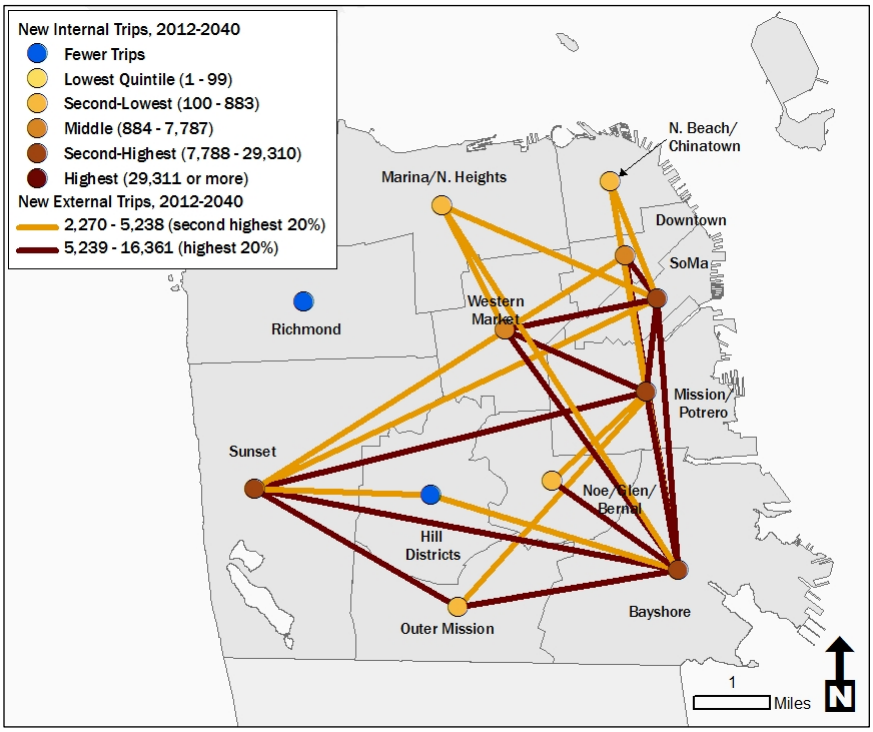
Figure 5 Change in Daily County Line Crossings by Automobile, 2012-2040



Source: SF-CHAMP 4.3.

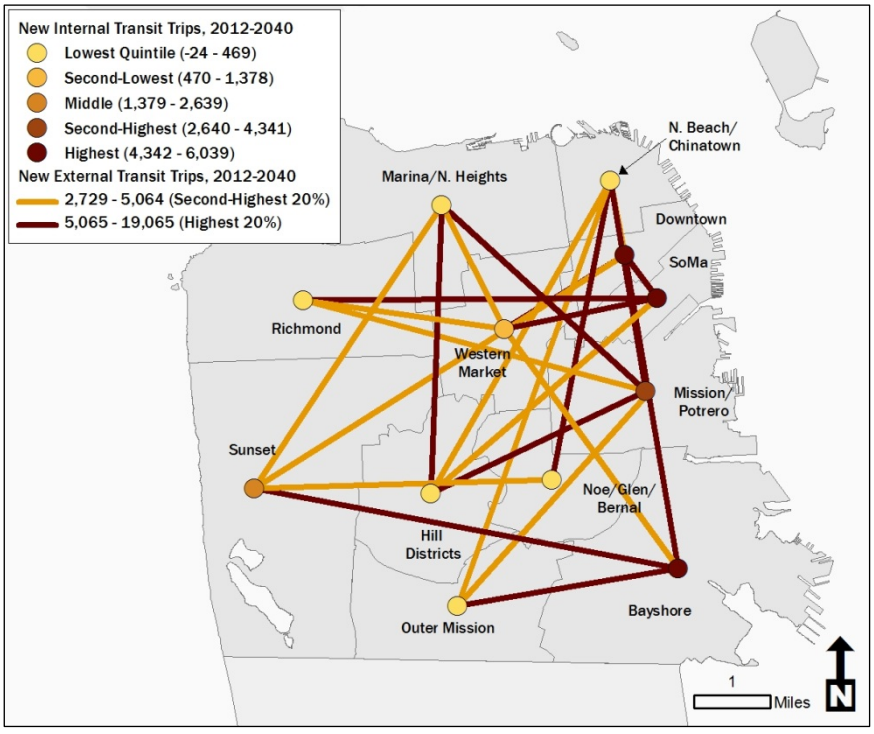
Figure 6 illustrates changes in auto trip-making patterns within the city: darker lines show the neighborhood pairs that will see the highest growth in auto trips between them, and these lines are concentrated along the city's eastern and southern borders. Darker brown circles indicate the neighborhoods that will see the biggest growth in internal auto trips, and again, they concentrate in the east and south. The transit system is also projected to see changes in trip-making patterns (Figure 7). The transit system is centered on the northeast core today, but the biggest increases in transit demand will be for trips across town, to and from the eastern neighborhoods.

Figure 6 Changes in Daily Auto Trip-Making Patterns within San Francisco, 2012-2040



Source: SF-CHAMP 4.3.

Figure 7 Change in Daily Transit Trip-Making Patterns within San Francisco, 2012-2040



Source: SF-CHAMP 4.3.

Economic Competitiveness: What Would it Take?

The SFCTA analyzed what it would take to meet specific quantitative transportation system performance targets for each SFTP goal area. The analysis results for economic competitiveness are presented below.

- **CHALLENGE:** One of the transportation-related factors that affects where employers choose to locate or expand is commute travel times for their employees. Commute travel times are expected to worsen in the future due to new growth.
- **TARGET:** Keep commute travel times (combined for car and transit commuters) to and from downtown San Francisco in 2035 from degrading relative to 2010.
- **IMPROVEMENTS:** This scenario analyzed three levels of investment, as described below.
  - **LOW:** Frequency improvements to local and regional transit service, Caltrain electrification, and lower-cost capital projects such as bus priority measures and more extensive traffic management on key commute corridors.
  - **MEDIUM:** The above plus more extensive programmatic investments in transit, congestion pricing, and higher-cost capital projects such as Caltrain's downtown extension and bus rapid transit on key corridors. A sensitivity test was conducted to determine the effect of a hypothetical regional policy that modestly increases parking prices in other major Bay Area employment centers.
  - **HIGH:** The above plus major capital projects, namely a new cross-bay BART tube and high-speed rail service.

Table 1: Performance of Economic Competitiveness Scenarios

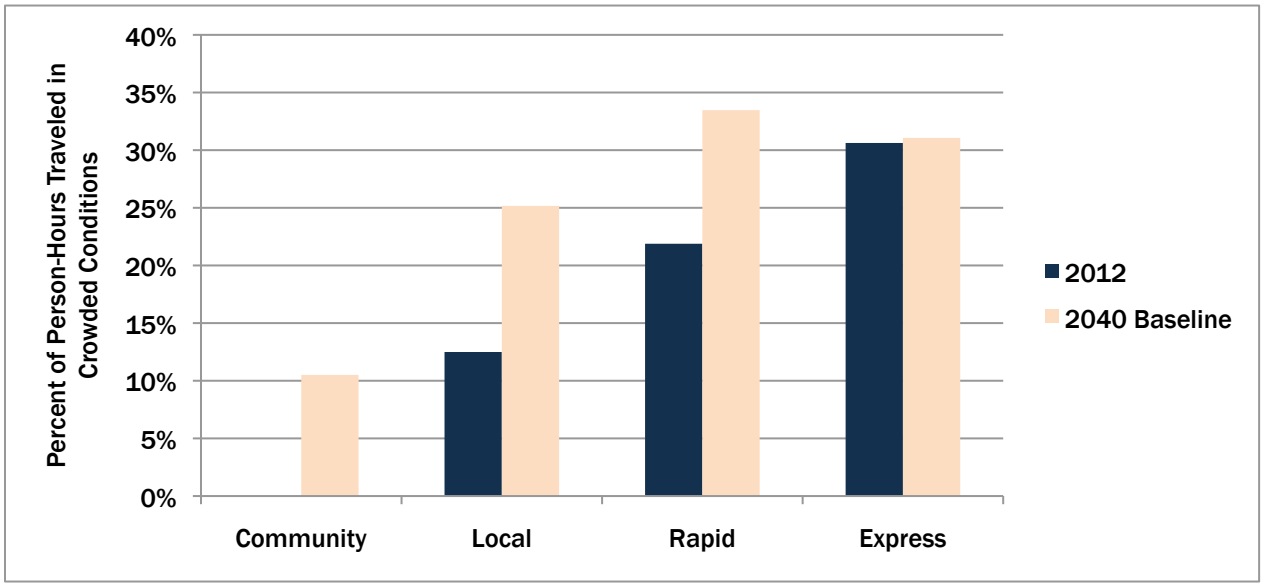
	2010	2035 BASE	2035 LOW	2035 MED	2035 MED + PARKING PRICING	2035 HIGH
Total average commute time to SF including non-motorized (minutes)	40	42	41	40	40	41
Auto	38	39	39	35	35	36
Transit	48	51	49	48	48	49
Cost (millions of $)	–	–	$2,000	$5,000	$5,000	$20,000
Cost Effectiveness	–	–	High	Med	Med	Low

- **COST:** From $2 billion (low level of investment) to $15 billion (high level of investment).
- **RESULTS:** Three of the scenarios (medium, medium with pricing, and high) keep combined car/transit commute travel times from degrading (see table above).
- **CONCLUSIONS:** The target under this scenario appears achievable. Between the low and medium levels, it takes an extra $3 billion in improvements to reduce travel times by one minute. The high level performs worse than the medium level perhaps because major investments such as a new BART tube increase overall travel significantly by improving accessibility. An additional finding was that because so many of San Francisco's commute trips begin or end in other cities, San Francisco's progress is greatly affected by policies implemented elsewhere. SF needs to take an active role in supporting regional policies that support its goals.

2.2.2 | TRANSIT CROWDING

By 2040, the city is forecast to see 300,000 new transit trips per day on a system that already suffers from crowding and reliability issues. Figure 8 shows that a significant percentage of transit passengers experience crowded conditions when traveling during peak hours today and that the issue is projected to get significantly worse under a 2040 baseline scenario. The baseline scenario includes the existing transit system and expansions or enhancements that have already secured significant funding or are already under construction. Crowded conditions are defined as vehicles with loads at 85 percent of capacity or more. As the figure shows, crowding is expected to increase significantly on all Muni service types except the express series.

Figure 8 Daily Person Hours of Travel in Crowded Conditions for Different Muni Service Types



Source: SF-CHAMP 4.3.

Crowding is particularly acute on the ten most crowded lines, with more than 60 percent of person-hours traveled spent in crowded conditions and a slight worsening of conditions on these lines by 2040. The total number of lines with any crowding is projected to grow from 31 to 50 over the plan period.

ADDRESSING CROWDED CONDITIONS

Expected crowding can be addressed, in part, by providing additional transit service during peak periods. However, the need to add peak-hour service should be balanced with consideration of cost-effectiveness (peak service is costly to provide), and equity concerns. Some lower-income shift workers depend on having adequate service during off-peak periods.

Figure 9 shows the current and projected spatial distributions of crowding. While Muni vehicles typically reach their most crowded points near the center of the system today, the extent of crowding moves outward from the core by 2040, in part as a result of significant new development at the end of several key lines and in part because of the increased employment pull of downtown and the eastern waterfront.

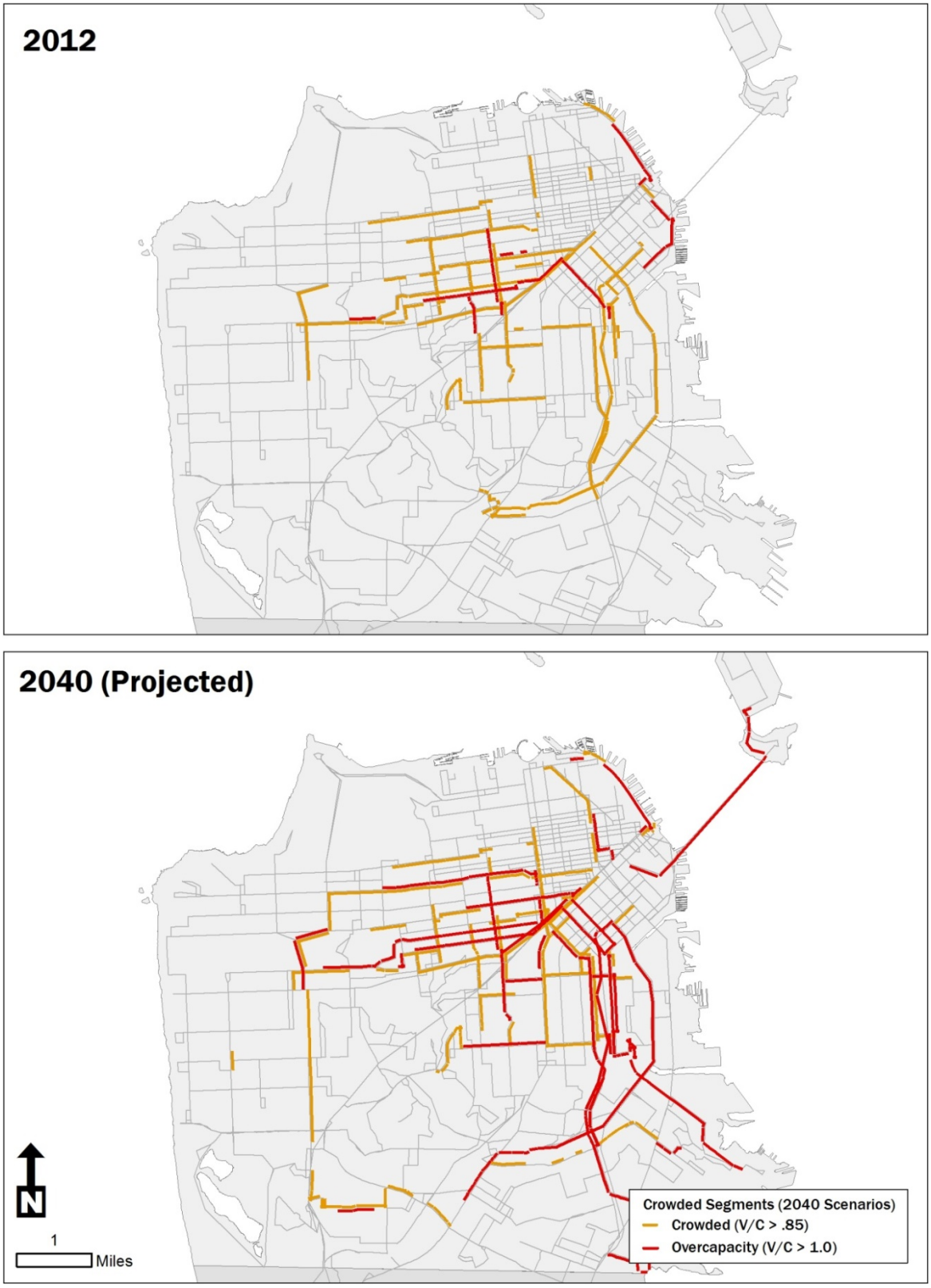
Regional operators will also feel the effects of San Francisco's growth. As Figure 10 shows, bus operators, including SamTrans, Golden Gate Transit, and AC Transit, already face peak-period crowding and would see that increase significantly by 2040. Caltrain and BART are both currently below 85 percent full during peak periods but would see some lines go over the threshold during the SFTP plan period.

For regional operators, crowding will have noticeable effects outside of transit vehicles as well. Projected ridership growth will make it more difficult to access stations and could make stations themselves crowded at key points in the system. BART ridership to, from, and within San Francisco is projected to grow by 37 percent, and as such, the system's two most crowded stations, Embarcadero and Montgomery, are forecast to hit limits in their capacity.[13] According to a BART study, delayed peak-hour conditions could lead to significant backups at escalators and crowding-related safety issues on platforms. Demand for travel to the system's core will also create station access issues outside San Francisco. Even with new transit-oriented developments around stations, BART will likely see issues like full parking lots and crowded feeder-bus routes throughout the system.

The agency has started to work solutions to all of these problems, exploring ways to redesign Embarcadero and Montgomery stations and improve parking management and bike and bus access,[14] but the agency and partner municipalities, including San Francisco, will need to identify funding for such changes once plans are in place. Caltrain could see similar problems up and down its corridor with projected ridership growth.

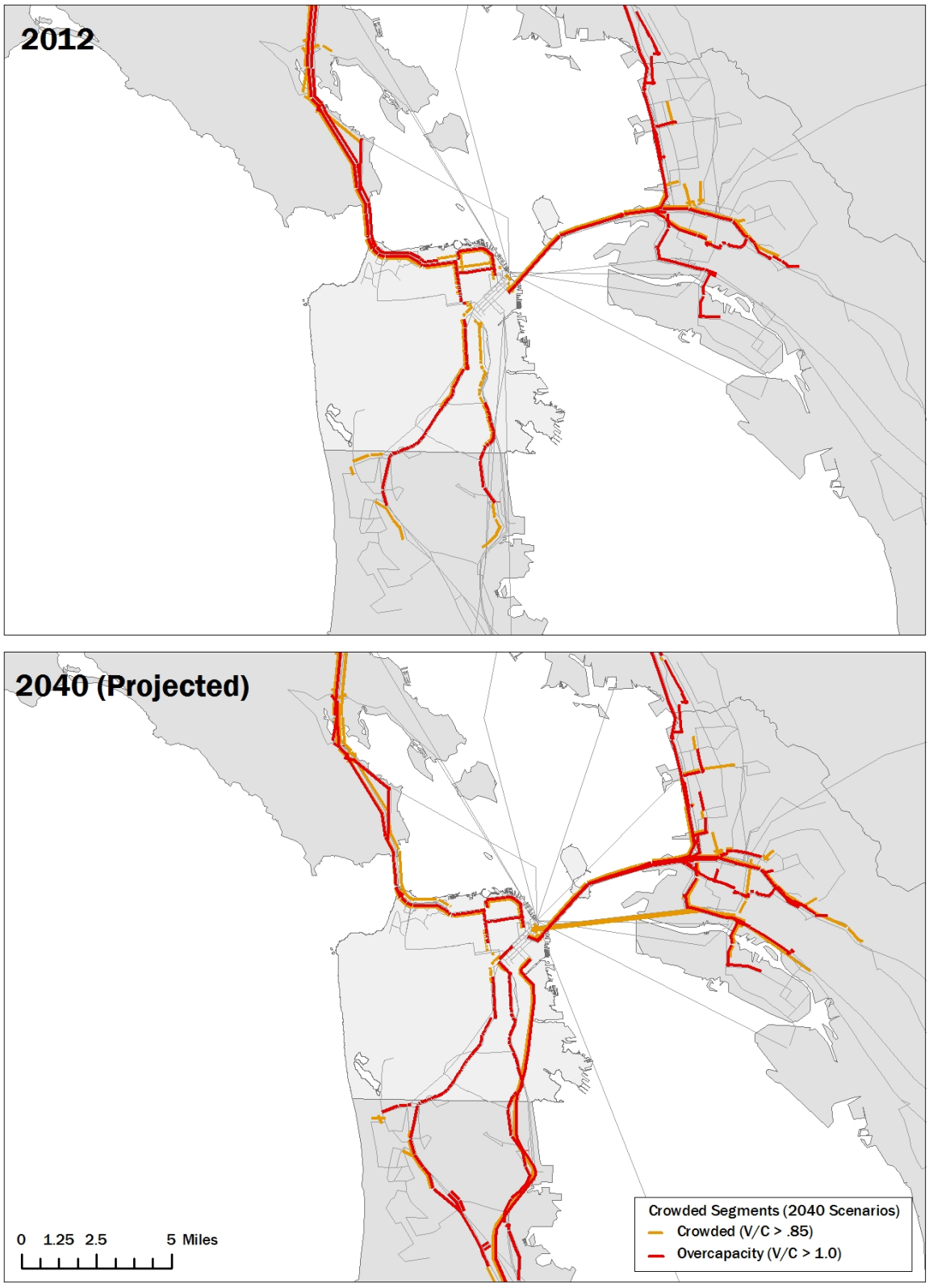
[13] Capacity Planning: Board Workshop, January 2013 (http://www.bart.gov/docs/capacity.pdf)
14 Capacity Planning: Board Workshop, January 2013 (http://www.bart.gov/docs/capacity.pdf), page 6.

Figure 9 Crowding on Muni, 2012 and 2040



Source: SF-CHAMP 4.3. O:\Active Studies\CWTP Update\Data\Zonal Maps\Crowding for map; Q:\Model Projects\sftp\ch430.JHC.2040.SFTP.NoProject\Outputs - SFTP Transit AM mdb 4040 and 2012

Figure 10 Regional Transit Crowding, 2012 and 2040.



Source: SF-CHAMP 4.3.

2.2.3 | STREET CONGESTION

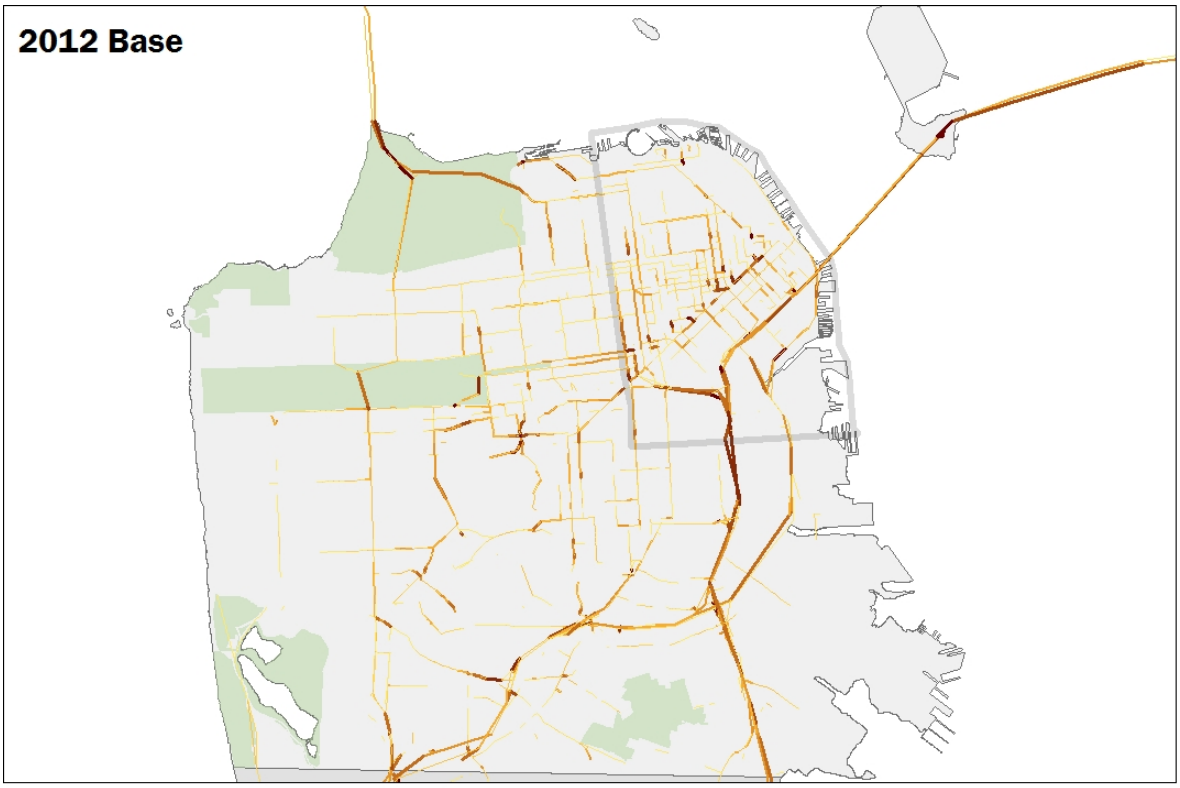
New population and employment will result in about 30 percent more automobile trips on the network compared to today, or an increase of about 600,000. Figure 11 illustrates the effects of this increase on the street network, and shows that many streets will reach or exceed levels considered congested or overcapacity.[15]

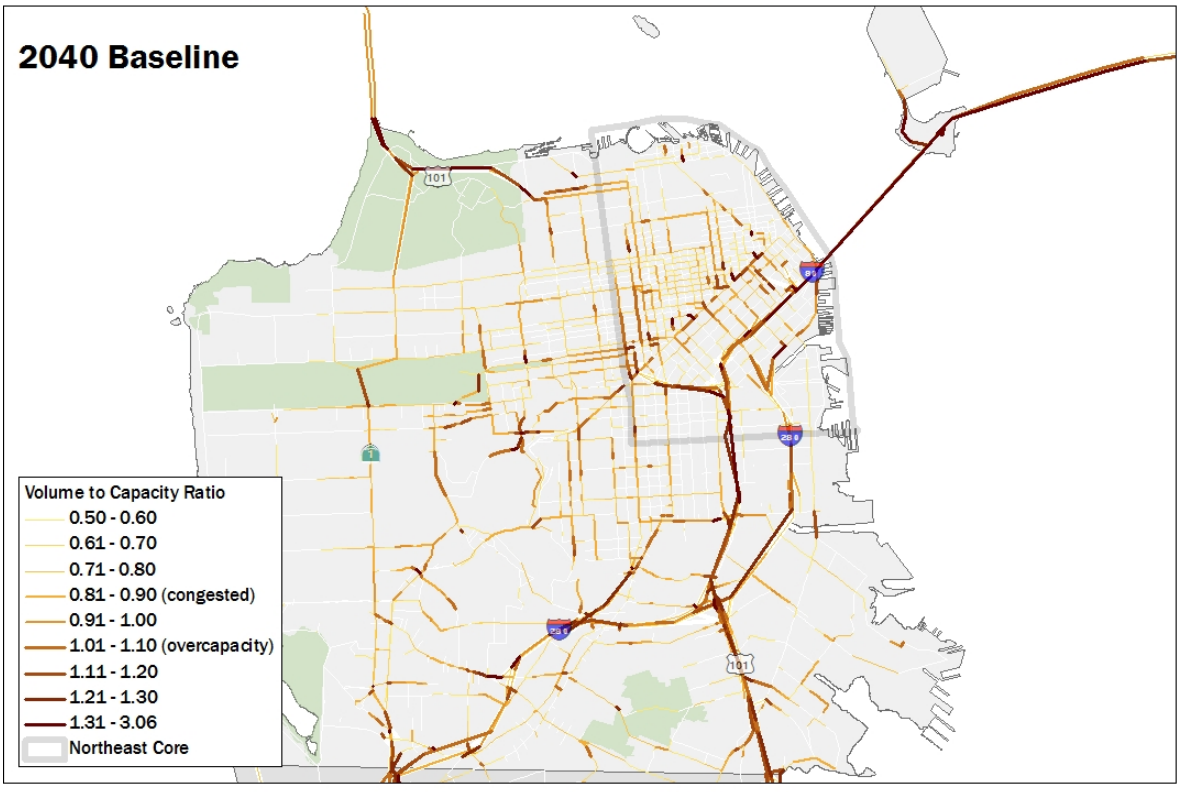
2.2.4 | TRANSIT SPEEDS

Overall modeled daily average speeds on the Muni network are around 11 miles per hour today. Projections for the 2040 baseline scenario show those speeds remaining the same in the future although street congestion worsens due to population growth. This is in part because several major transportation improvements included in the future baseline (such as the Van Ness Bus Rapid Transit Project, the Central Subway, and others) improve conditions for transit and offset the negative effects of congestion.

[15] Congestion is defined as a ratio between a road's volume and its capacity of between .8 and 1.0. "Congested" means vehicle volumes are between 80% and 100% of the volumes the road was designed to handle. "Overcapacity" is defined as a ratio of more than 1.0, in which a road carries volumes that are greater than the levels for which it was designed.

Figure 11 Congestion, 2012 and 2040





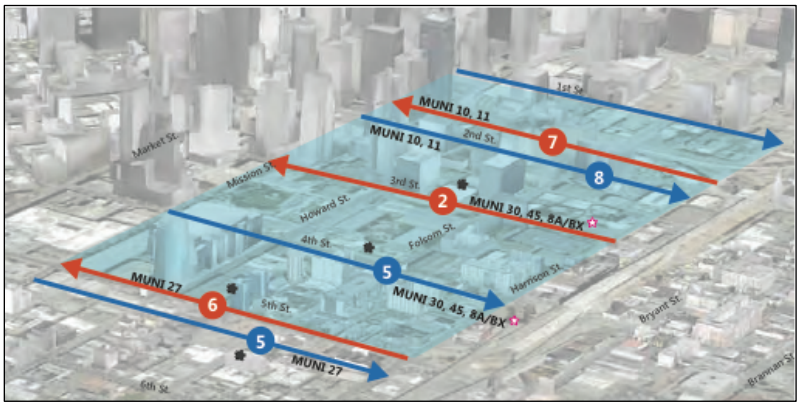
Source: SF-CHAMP 4.3.

2.2.5 | CONGESTION IN THE NORTHEAST CORE

The effects of increased congestion will be most acute in SoMa, given the area's significant projected job and housing growth and its location between Interstate 80 and the city's dense job core. The forecast increase in auto traffic is projected to lead to gridlock during peak periods, with queues at traffic lights spilling into downstream intersections and bringing multi-block areas to a standstill. Avoiding these cascading effects in this critical part of the system would require a 27 percent reduction in private-vehicle traffic in SoMa.[16]

Gridlocked conditions in SoMa would slow transit vehicles as well as cars. As Figure 12 shows, some of the bus lines that run through the neighborhood would slow to the low single digits during the evening peak hour. Such slow speeds would have a ripple effect across Muni's bus system, tying up drivers and vehicles and exacerbating reliability issues throughout the city.

Figure 12 Projected 2035 SoMa Bus Speeds (miles per hour), Evening Peak Hour



Source: SF-CHAMP 4.3 volumes for "Baseline Prime," Fehr + Peers SimTraffic Analysis, 2012

2.3 | Summary of needs

San Francisco needs to improve its transportation system, especially in the downtown core, to accommodate new growth. The following strategies could help address transit and roadway crowding caused by development growth:

- **ENHANCED TRANSIT CAPACITY IN GROWING AREAS (E.G. CORE, SOUTHWEST, SOUTHEAST), ESPECIALLY ON REGIONAL TRANSIT.** BART has already started to explore increasing its capacity in the most heavily used parts of its system through the BART Metro concept, which could increase service levels, platform capacity, and/or the number of stops between the Mission in San Francisco and downtown Oakland. Caltrain is also working to increase the number of trains it can run every hour through electrification (see Section 2) and new communications equipment that would allow the system to safely run trains closer together during peak times. Implementing these ideas could help reduce auto traffic on downtown streets.

- **IMPROVED DIRECT REGIONAL TRANSIT SERVICES FOR AREAS OF THE CITY LESS WELL SERVED BY TRANSIT.** Much of the west side of San Francisco is at least a bus ride away from the Bay Area's regional transit system. A regional express-bus system providing direct connections from San

[16] Brisson, Liz, Kyle Gebhart, and John Urgo. "Core Network Circulation Study – Evaluation Framework and Baseline Analysis Findings." 9/14/2012.

Francisco's west side to regional transit and regional employment centers could help address the growing numbers of trips expected between the west and east sides of the city.

- **IMPLEMENTATION OF INVESTMENTS CRITICAL TO MEET NEW DEMAND GENERATED BY DEVELOPMENT.** The city and developers have already agreed to a set of transit enhancements to serve the major developments that will come online between now and 2040. Timely implementation of these investments – including enhanced bus and ferry service to and from Treasure Island, light-rail enhancements serving San Francisco State University and Parkmerced, express-bus service to Candlestick and Hunters points, and the other enhancements already underway as part of the Southeast Waterfront Transportation Plan –will be critical to accommodating new growth in these areas.

- **MORE EFFICIENT USE OF FREEWAY CAPACITY TO SERVE TRAVELERS, ESPECIALLY IN THE SOUTH BAY MARKET.** High occupancy vehicle lanes on the city's freeway system and other performance enhancements could encourage carpooling and ensure that commuters are making efficient use of ever more crowded infrastructure.

- **DIRECT CONGESTION MANAGEMENT AND PARTNERSHIPS WITH PRIVATE OPERATORS.** The city will also need to provide financial disincentives to driving alone into the congested core through congestion pricing and transportation demand management partnerships with private companies. See Section 5 for more detail.

3 World-Class Infrastructure

SECTION SUMMARY:

- After years of underinvestment, Muni and regional transit agencies that serve San Francisco have significant unfunded capital needs.
- Poor vehicle condition is already responsible for many transit service delays and the situation will worsen without increased investment.
- Operating costs are growing rapidly and will crowd out critical capital investments if transit agencies do not take steps to control growth in costs.
- Pavements will require significant new investment to maintain adequate conditions.

San Francisco's transportation system relies on aging infrastructure that will need significant repair or replacement over the course of the plan period. This section discusses investments needed to achieve the goal of world-class infrastructure and maintain a state of good repair.

It includes the following sections:

- **TRANSIT OPERATING NEEDS** discusses what it will take to keep the existing system running given rising transit operating costs. It does not discuss the additional service expansion necessary to accommodate San Francisco's growing population and employment, which were covered in the prior section on Economic Competiveness.
- **TRANSIT MAINTENANCE NEEDS** discusses what it will take to repair and replace vehicles and fixed infrastructure at the appropriate times in their lifecycles over the course of the plan period and the performance consequences of not investing sufficiently in capital asset maintenance.
- **ROADS, BRIDGES, AND STRUCTURES** discusses investments needed to meet city pavement-condition goals and keep bridges and other structures in safe operating conditions for all users.

3.1 | Goals and Performance Measures

The SFTP world class infrastructure goal is to improve the condition of San Francisco's infrastructure so that it is reliable and can be maintained cost-effectively. Key goals and performance measures for this section include:

- Stabilize transit operating costs
- Improve transit system reliability through adequate maintenance
- Achieve a pavement condition index of 70 [Proposition B streets bond goal]
- Maintain road and bridge structural sufficiency

3.2 | Trends and future conditions

3.2.1 | TRANSIT OPERATING NEEDS

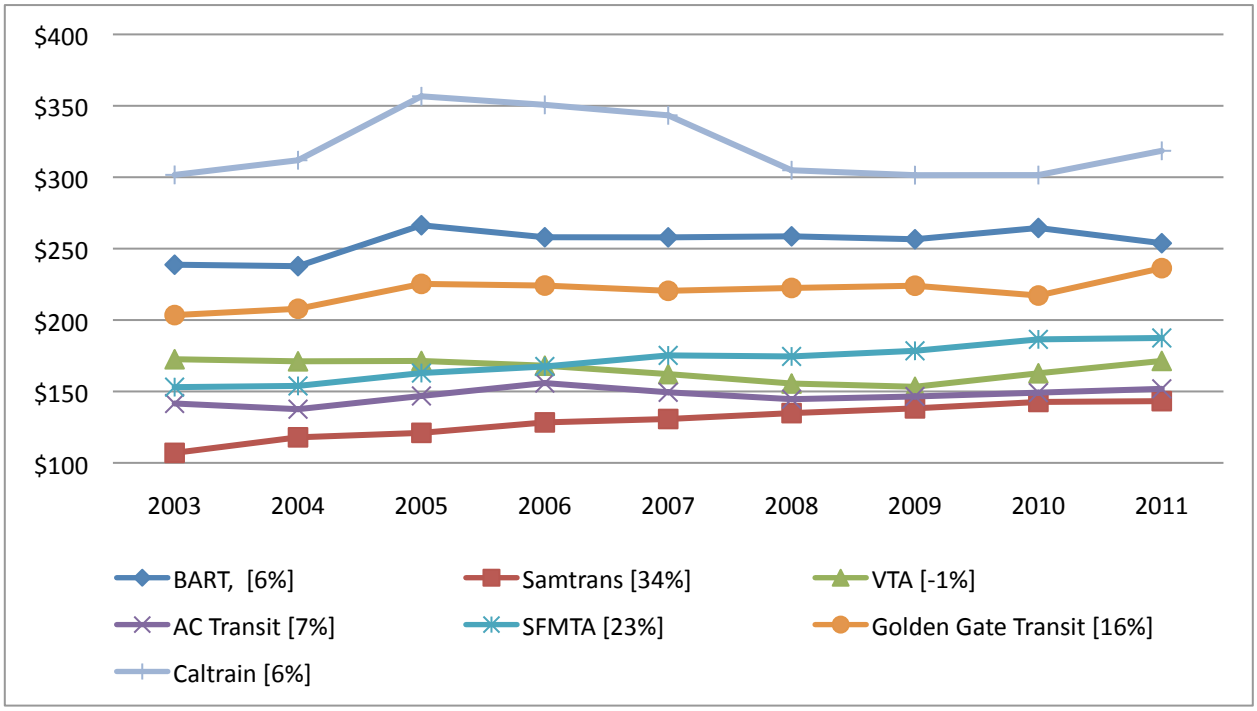
Transit operating expenses include the cost of wages for vehicle drivers, maintenance and customer-service staff, system administrators, and others. They also include the cost of fuel or energy to power transit

vehicles and parts or other materials for regular maintenance tasks. Transit operating needs alone will take up nearly 60 percent of available revenues. If current trends continue, funding needs could be even higher and could crowd out system-efficiency projects and those aimed at serving new trip patterns. Among these trends:

- **RISING COSTS:** The real cost of providing transit service has been rising over the last several decades (Figure 13). According to the Metropolitan Transportation Commission's Transit Sustainability Project, rising fringe benefit costs are a major contributor to cost growth. The cost of fringe benefits like health care and pensions nearly doubled between 1997 and 2008 (Figure 14).

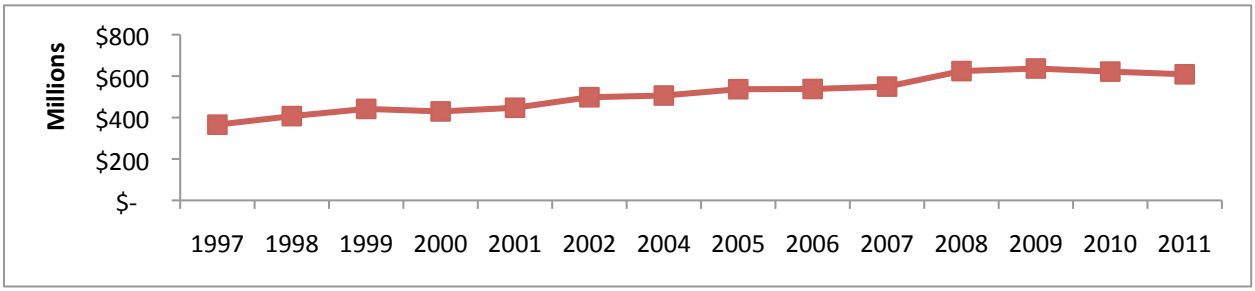
- **SLOWER SPEEDS AND LOWER RELIABILITY FOR SFMTA AND REGIONAL BUS OPERATORS:** A less direct but still important operating-cost driver, speeds slowed significantly on SFMTA's bus and light-rail systems between 1997 and 2008 (see Figure 15). Slower speeds mean a driver and vehicle can complete fewer route runs in a day, leading to less service for the same price.

Figure 13 Cost per Hour of Service, 2003-2011 (Inflation-Adjusted)



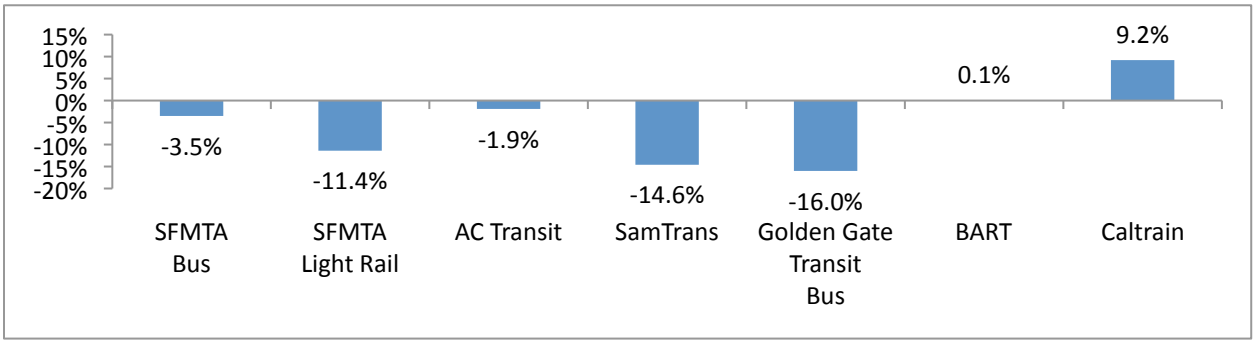
SOURCE: NATIONAL TRANSIT DATABASE TS2.2 - SERVICE DATA AND OPERATING EXPENSES TIME-SERIES BY SYSTEM, AND THE CALIFORNIA DEPARMENT OF FINANCE (FOR BAY AREA INFLATION DATA).

Figure 14 Growth in General and Fringe Benefit Costs for Agencies Serving San Francisco, 1997-2011 (Inflation-Adjusted)



Agencies included: SFMTA, BART, AC Transit, Golden Gate Transit, and SamTrans. Caltrain contracts for operations and maintenance, so fringe benefit data only covers administration and was not included.

Figure 15 Change in Average Speed, 1997-2008



Source: Metropolitan Transportation Commission. Transit Sustainability Project: Background and Findings. September 2011, page 8.

Agencies are already taking steps to make their operations more efficient. The MTC's Transit Sustainability Project created an incentive program that is aimed at reducing agencies' operating costs[17] by 5 percent by the middle of this decade. Implementation of additional cost-control recommendations from the TSP, such as capping agency contributions to health insurance costs, could also be explored.

Strategies to improve transit vehicle speeds and reliability can also help address crowding, since faster-moving vehicles are less expensive to operate. SFMTA is moving forward with its Transit Effectiveness Project, which aims to improve speeds and make operations across the system more efficient through route changes, stop consolidation, and small-scale investments like curb bulb-outs and painted transit-only lanes at key bottlenecks. Caltrain is moving forward with a plan to power its trains by overhead wires rather than diesel locomotives, which is projected to save fuel costs and trim travel times up and down the corridor due to faster acceleration and deceleration rates. BART is also studying expanded service in the system's core, between downtown Oakland and the Mission in San Francisco, allowing it to more efficiently meet demand in the highest ridership portion of the system. Many of these projects support both the world class infrastructure and economic competitiveness goals.

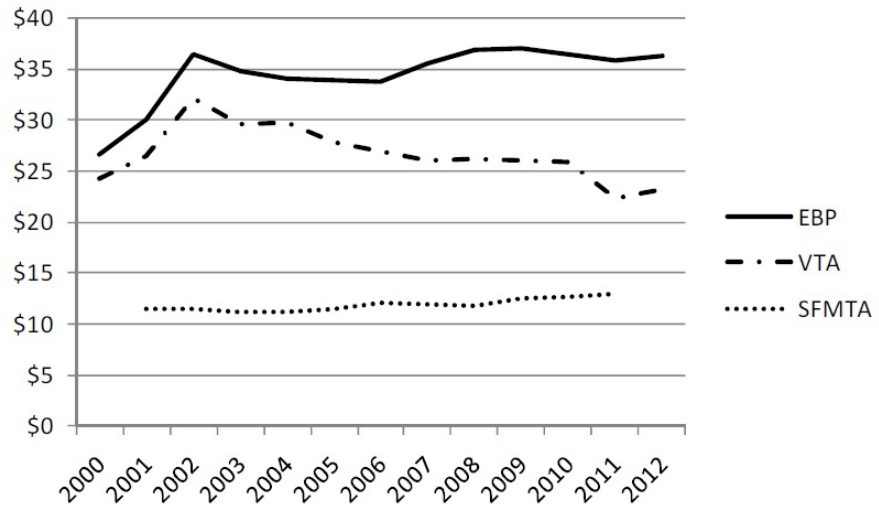
3.2.2 | PARATRANSIT

Growth in San Francisco's senior population and accompanying demand for paratransit services may also put additional growth pressure on operating costs, though SFMTA and other large paratransit operators in

[17] The MTC Transit Sustainability Project's final recommendations say these reductions can be per service hour, per passenger, or per passenger mile.

the Bay Area have effectively controlled the cost of such services on a per-trip basis in recent years (see Figure 16).[18] As of 2011, paratransit services made up just over 5 percent of transit operating costs region-wide.

Figure 16 Paratransit Operating Cost per Eligible Passenger Trip, Large Bay Area Operators



Source: Metropolitan Transportation Commission. "Transit Sustainability Project: Draft Paratransit Final Report." August 29, 2011. Page 3-10. Note: Dollars adjusted for inflation. VTA is Valley Transportation Agency, EBP is East Bay Paratransit.

San Francisco's senior population is projected to grow by 68 percent over the plan period, which should increase demand and thus the total cost of paratransit over time. However, several recent research reports on the strength of the relationship between the size of a city's elderly population and the level of paratransit demand have reached conflicting conclusions. While data shows that paratransit demand increased by 37% nationally between 2000 and 2009, and the American Public Transportation Association forecasts a 32% increase in paratransit demand by seniors between 2010 and 2020, a 2007 report concluded that demand is more closely related to an area's total population than to its senior population.[19] Further study is needed to quantify precisely how costs will increase as the elderly population grows.

[18] Metropolitan Transportation Commission. "Transit Sustainability Project: Draft Paratranist Final Report." San Francisco: August 29, 2011, page 3-10.
[19] *Ibid*, 3-18.

3.2.3 | TRANSIT CAPITAL NEEDS

Bay area transit operators face significant transit capital shortfalls totaling approximately $5 billion over the SFTP plan period. These capital needs include new vehicles and mid-life overhauls and for repairing or rebuilding existing infrastructure. Table 1 shows the total need, San Francisco share, and projected funding shortfall for Muni and the regional operators that serve San Francisco.

Table 1 Transit Capital Revenue and Need, 2012-2040 (In Billions, Year-of-Expenditure Dollars)

Operator	Total Need[1]	Revenue Vehicle and Score 16[3] Need	Revenue Vehicle and 70% of Score 16 Need	Expected Transit Capital Revenue	Total Shortfall
SFMTA	$12.7	$9.1	$7.6	$8.4	$4.3
Caltrain (SF Share)	$1.1	$0.7	$0.5	$0.4	$0.8
BART (SF Share)[2]	$2.1	$2.1	$2.1	$2.1	N/A
GGBHTD (SF Share)[2]	$0.3	$0.3	$0.3	$0.3	N/A
Grand Total	$16.16	$12.13	$10.48	$11.10	$5.07

[1] Need to meet target of 0% of assets past useful life.
[2] For the purpose of this assessment we are not expecting SF to have a discretionary share of the BART and GGBHTD capital need. BART and GGBHTD needs will be addressed at the regional/partner level.
[3] Score 16 vehicles are those the regional government has identified as top priority for replacement.

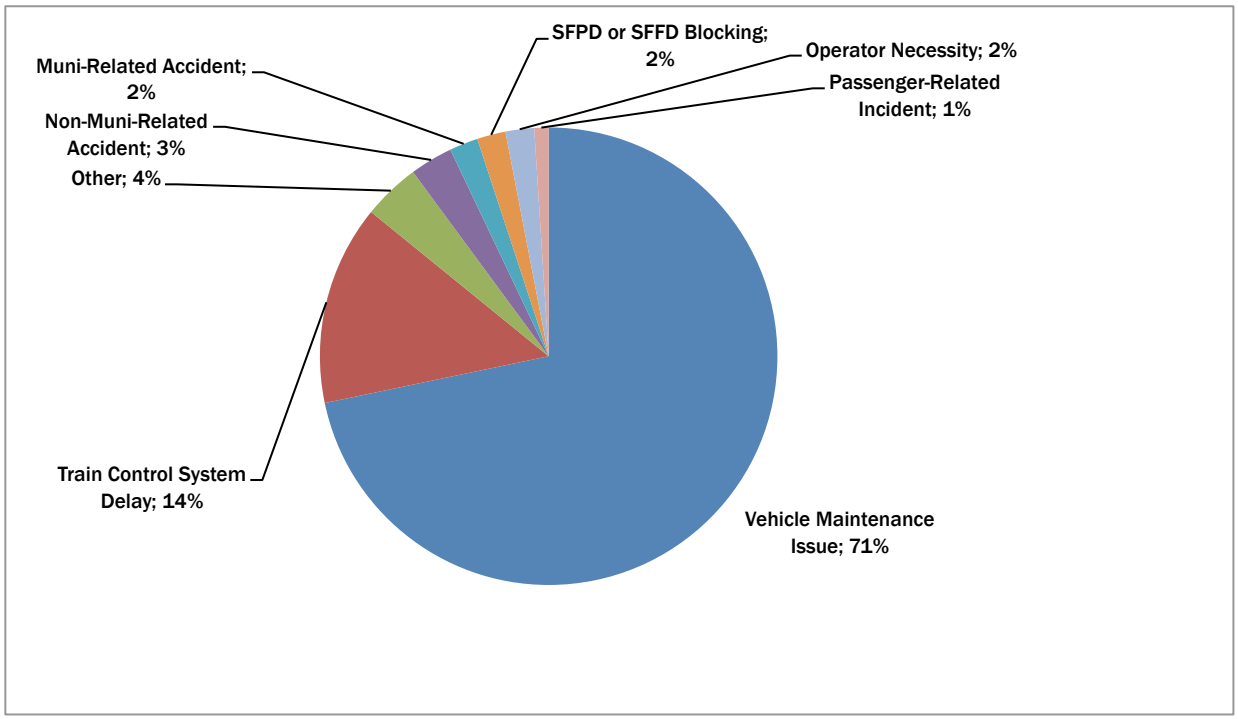
Shortfalls in state-of-good-repair investments can lead to significant reliability, safety, and customer-satisfaction issues. Specifically, they can, over time, cause:

- **VEHICLE BREAKDOWNS.** Failing to perform routine service on buses and rail cars can increase maintenance issues later in vehicles' lives. Poor transit vehicle maintenance has significant reliability impacts, resulting in service breakdowns, unscheduled turnbacks, and delays in tunnels. Illustrating this point, Muni's aging light-rail fleet had on-time performance of 50 percent in May 2013, and vehicle mechanical issues were responsible for 71 percent of the delays (see Figure 17).

- **INFRASTRUCTURE PROBLEMS.** Failing to invest appropriate amounts in fixed infrastructure can lead to cracked or worn-down rails, electricity issues, and communications problems along whole segments of the system, causing more frequent service suspensions for emergency repairs. It can also require initiation of "go slow" zones, further reducing speeds. As shown in Figure 17, train-control system delays were the second-largest cause of light-rail delay in May 2013. These maintenance-related delays are experienced on top of the routine delays associated with street congestion, traffic signals, and so forth.

- **DEGRADATION IN PASSENGER SAFETY AND COMFORT.** All of these issues have an impact on passenger safety and comfort, as they lead to lower adherence to service schedules and more frequent inconveniences like vehicle turn-backs and pass-ups. Additionally, they can lead to unevenness in passenger loads, with significant crowding on delayed vehicles.

Figure 17 Muni Light Rail Reasons for Delay, May 2013



Source: SFMTA 2013.

Table 1 shows that transit capital needs are very large and that much of the need is unfunded. This is because of the age of the region's transit systems, many of which are among the oldest in the state. The region as a whole, and San Francisco in particular, relies heavily on rail systems, which require higher ongoing maintenance investments than other modes because of the significant amount of fixed infrastructure they require.[20] Budget pressure over the last several years, which resulted in some deferred maintenance in addition to service cuts, also contributed to the large amount of need going forward. The following sections describe operator capital needs in more detail.

MUNI

Based on the direction set in its 2010 Fleet Plan, the agency aims to steadily lower the average age of its fleet through smaller vehicle procurements every few years instead of large procurements every five or 10 years, as it has done in the past.[21] As of 2010, the average Muni vehicle age was 7.5 years, but the agency projects that it can reduce that to 4 to 6 years by 2030. This approach would help keep enough operational vehicles available for peak service and reduce stress on the agency's maintenance department by spreading out lifecycle maintenance demands.

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[20] Metropolitan Transportation Commission. *Plan Bay Area*. Draft, March 2013. Page 67.
[21] San Francisco Municipal Transportation Agency. *2010 SFMTA Transit Fleet Management Plan*. Revised April 2011. Retrieved from http://beta.sfmta.com/cms/rhome/documents/2010FleetPlan_MainText-FinalAccessible.pdf on 9/16/13.

Beyond vehicles, Muni has several other areas of need related to maintaining a state of good repair. The agency estimates that, given the need for more vehicles of all types due to increased peak-hour demand, it will need more than 17 additional acres for maintenance facilities through 2030.[22] A portion of the total need also includes repairing or replacing rails, wires, and systems for train control and communication.[23]

REGIONAL TRANSIT OPERATORS

Caltrain will be transitioning from its current diesel-powered trains to new electric-powered trains by 2019. As such, the system's needs are related to both existing vehicles' ages and the need to buy train cars that are compatible with the new technology. Many of Caltrain's locomotives are more than 25 years old, near the end of their useful lives, and their age is already resulting in increased delays and maintenance issues.[24]

BART's vehicle fleet is one of the oldest and most heavily used in the industry, with an annual average of 95,000 miles of use per car.[25] As such, the agency's vehicle-replacement and maintenance needs make up a significant proportion of its total capital needs over the plan period. The agency also expects that it will need 30 percent more rail cars by 2030 to serve a growing number of riders. Given all of these factors, the agency's total capital shortfall is the largest of any Bay Area operator.[26]

Golden Gate Transit's capital needs are all related to replacing its more than 200 buses and 5 ferries at the end of their useful lives and growing its fleet as needed to meet passenger demand.[27]

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[22] SFMTA (2011), page 38.
[23] SFMTA. *2011 20-Year Capital Plan*. Page 9. Retrieved from https://www.sfmta.com/sites/default/files/FInalCapitalPlanMTAB_accessibleplan.pdf on 9/16/13.
[24] Emslie, Alex. "Aging Caltrain fleet leading to longer delays." San Francisco Examiner. September 18, 2013. Retrieved from http://www.sfexaminer.com/sanfrancisco/aging-caltrain-fleet-leading-to-longer-delays/Content?oid=2580990.
[25] Bay Area Rapid Transit. "New Rail Vehicle Program: Board Workshop." January 2013, Slide 11. Retrieved from http://www.bart.gov/docs/NewVehicleProgram.pdf on 9/16/13.
[26] MTC. *Plan Bay Area: Transit Operating and Capital Needs and Revenue Assessment.* Draft March 2013. Retrieved from http://onebayarea.org/pdf/Draft_Plan_Bay_Area/Draft_PBA_Transit_Operating_and_Capital_Needs_and_Revenue_Assessment.pdf on 9/16/13.
[27] Golden Gate Bridge, Highway, and Transportation District. *Short-Range Transit Plan, Fiscal Years 2008-2017*. Page 3-2. Retrieved from http://goldengatetransit.org/services/documents/SRTP-Chapter3.pdf on 10/2/13.

World Class Infrastructure: What Would it Take?

- **CHALLENGE:** San Francisco has an extensive and aging transportation infrastructure. Funding is not sufficient to adequately maintain the system in a state of good repair.
- **TARGET:** Raise the city's transportation system to a state of good repair, defined as:
    - Transit: fully fund transit vehicle replacement and mid-life overhauls and replace all capital assets at the end of their useful life; maintain today's levels of transit operations.
    - Roads: achieve a pavement quality index of 70 and maintain today's levels of street operation.
- **IMPROVEMENTS:** This scenario estimated the funding needed to achieve the state of good repair performance measures listed above. It does not include any needs associated with meeting additional demand due to population and employment growth.
- **CONCLUSIONS:** An additional $5 billion in year-of-expenditure dollars through 2040 would be needed to fully fund all transit capital maintenance needs. An additional $1.5 billion is necessary to reach and maintain a pavement condition index of 70. Existing revenues are sufficient to maintain today's levels of street and transit operation.

3.2.4 | STREETS AND BRIDGES

Maintaining San Francisco's road and bridge infrastructure is another key element of achieving the goal of world-class infrastructure. Smooth and well maintained streets increase safety and reduce wear and tear on both private cars and transit vehicles and make conditions safer for bikers and pedestrians.

As of 2011, the average pavement condition on local streets was "fair," with a pavement condition index rating of 64 out of 100, although TRIP: A National Transportation Research Group recently ranked the San Francisco-Oakland metropolitan area's roads the second worst in the country, with 60 percent of roadways in poor condition.[28]

In developing the Proposition B streets bond in 2011, the Department of Public Works and the San Francisco Capital Planning Committee set a goal of achieving an average citywide PCI score of 70, which is considered "good" condition, by 2021. Proposition B increased San Francisco's annual street resurfacing budget from $26 million in 2011 to $65.5 million in 2012 and provided funds for this increased investment level for four additional years. Achieving and maintaining a PCI score of 70 over the long term will require a total investment of $3.83 billion over the life of the plan, $1.53 billion more than is already committed to street resurfacing. Without a sustained, long-term increase in street resurfacing funding, San Francisco's PCI score will fall below 60 and into "poor" condition by 2030.

Streets and roads also require an investment of $2.84 billion in street operations like street cleaning, pothole filling, and signal maintenance; this funding is available through existing sources.

[28] TRIP: A National Transportation Research Group. "Bumpy Roads Ahead: America's Roughest Rides and Strategies to Make our Roads Smoother." Washington, DC: October 3, 2013. Retrieved from http://www.tripnet.org/docs/Urban_Roads_Report_Oct_2013.pdf on 10/11/13.

Bridges and other structures, including the state-owned freeways that run through San Francisco, will require additional investments over the coming decades. According to a recent study by Transportation for America, most of San Francisco's bridges are in good condition, but segments of U.S. 101 and a few non-freeway bridges will be in need of attention in the next 20 years.[29] In many cases, bridge decks (the concrete road beds on which surface asphalt rests) are the element that needs the most urgent attention, rather than deeper structural elements.

Caltrans owns and maintains state and US highways and interstates and will be responsible for funding the upkeep and replacement of highway bridges and structures. San Francisco government agencies can play an important role in advocating for timely investment in these structures. The Department of Public Works maintains a number of additional local-road bridges, retaining walls, and stairways that will need to be repaired or rebuilt over the life of the plan. The department prioritizes and funds maintenance needs through a citywide 10-year capital planning process.

[29] Transportation for America. "The Fix We're In For: The State of Our Bridges." Retrieved from http://t4america.org/resources/bridges/#?latlng=37.77583200000001,-122.4180973&bridge_id=%0A340034 on 9/16/13.

4 Livability

SECTION SUMMARY:

- Infill development near transit within San Francisco is expected to slightly increase the share of trips made by bicycling and walking by 2040, but this will be insufficient to achieve the city's aggressive goals. Additional investment will be needed.
- Investments in safety for walkers and bicyclists is a critical step necessary to allow growth in walking and bicycling.
- The SFMTA's Bicycle Strategy provides a vision for a safe, interconnected network of protected bicycle-ways, but funding is not sufficient to complete the network.
- The SFMTA's Pedestrian Strategy provides a vision for reducing collisions on the 44 miles of the most dangerous roadways. Funding is not sufficient to implement the strategy.

The concept of livability has become a key focus in recent years. Former U.S. Secretary of Transportation Ray LaHood described livability as "being able to take your kids to school, go to work, see a doctor, drop by the grocery or post office, go out to dinner and a movie, and play with your kids in a park, all without having to get in your car.[30]" The SFCTA also recently held a twitter contest to define livability and received numerous creative responses (Figure 18).

Figure 18 Responses to SFCTA Twitter Contest on Defining Livability

This section reviews recent trends and future needs with respect to improving the quality of alternatives to the automobile, with a particular emphasis on bicycling and walking.[31] It includes discussion of the current

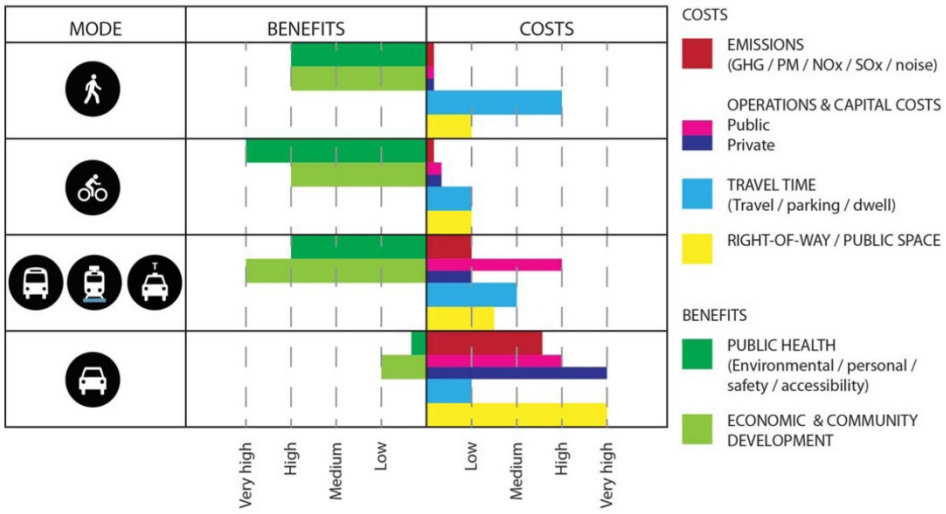
[30] See the U.S. DOT's livability web page: http://www.dot.gov/livability

[31] Mass transit is covered in the World Class Infrastructure and Economic Competitiveness sections.

condition of bicycling and walking infrastructure, recent planning efforts in the area of bicycling and walking, and a summary of future investments needed to make bicycling and walking as safe and attractive as possible.

Bicycling and walking are the focus of efforts to improve livability because they are environmentally sustainable, pollution-free, and healthful modes of travel, and are inexpensive relative to other modes of travel, as illustrated in Figure 19. Additionally, if bicycling and walking investments shift even a small number of trips out of crowded transit vehicles, significant savings can be realized since peak-period demand is a key driver of the cost of providing transit service.

Figure 19 Cost Effectiveness of Bicycling, Walking, Transit, and Automobile Use



Source: SFMTA Bicycle Strategy.

4.1 | Goals and performance measures

The SFTP livability goal is to improve the quality and safety of the bicycle, pedestrian, and transit networks so that San Franciscans can have multiple attractive options for getting where they need to go. Performance measures for this area include:

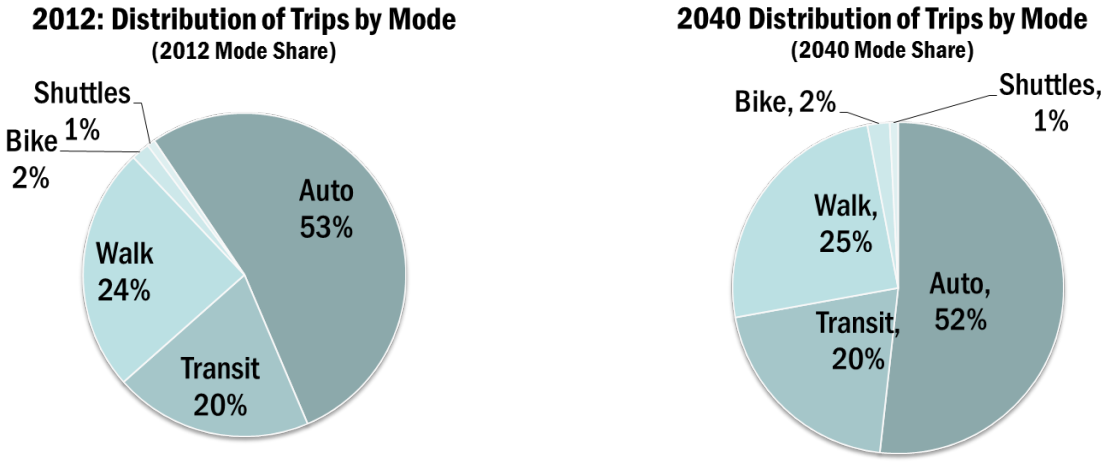
- **THE SHARE OF TRIPS MADE BY BICYCLING, WALKING, AND TRANSIT.** SFMTA has set a goal of greater than 50 percent of trips by these non-automobile modes. The Board of Supervisors set a goal of a 20 percent bicycle mode share by 2020.
- **BICYCLE AND PEDESTRIAN SAFETY.** The Mayor's Pedestrian Safety Task Force set a goal of reducing severe and fatal pedestrian collisions by 50 percent by 2021.
- **TRIP LENGTHS** (shorter trips are more easily made with non-motorized modes).

4.2 | Trends and future conditions

The outlook for increased rates of bicycling and walking is good. As San Francisco adds population and employment to areas already convenient for bicycling and walking (see the Economic Competitiveness section for a discussion of land use projections), the share of trips made by bicycling and walking is expected to grow slightly (by about a percentage point) without any additional infrastructure investment (Figure 20).

Nevertheless, as the following discussions demonstrate, additional investment will be needed for the city to meet its aggressive goals for increasing the share of trips made by bicycling and walking.

Figure 20 Distribution of All Trips To, From, and Within San Francisco by Mode, 2012 and 2040 Baseline

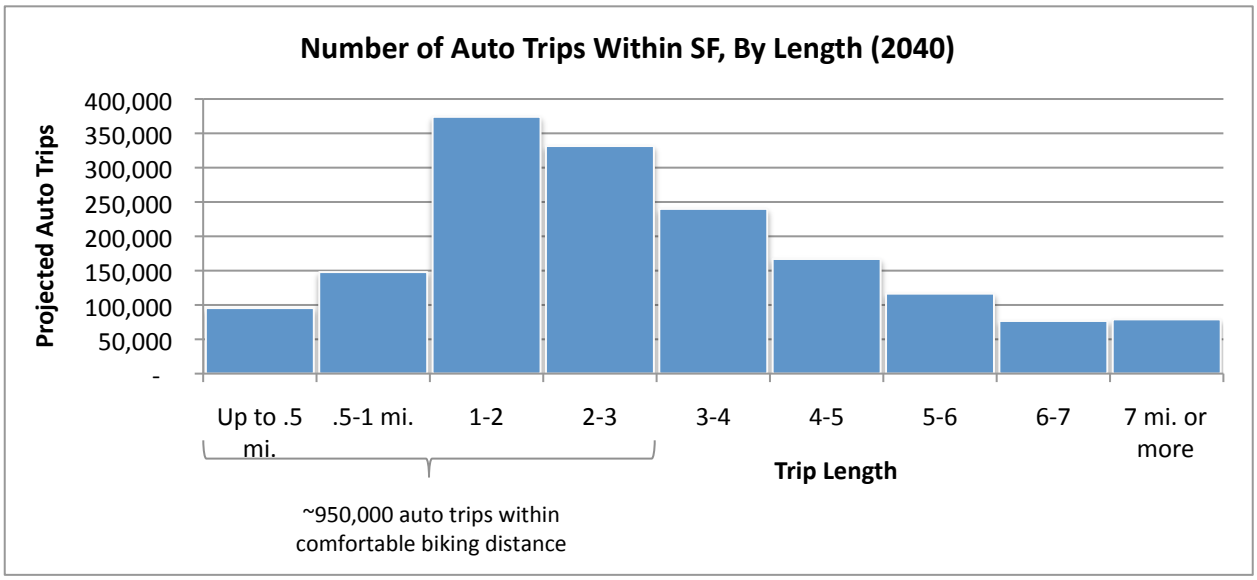


Source: SF-CHAMP 4.3 with manual adjustments to include private shuttle sector.

4.2.1 | BICYCLING

Bicycling is on the rise in San Francisco. The SFMTA's State of Cycling Report indicates that bicycle trip volumes are approaching 75,000 bicycle trips per day; nearly a third of San Francisco residents report bicycling at least occasionally. Rates of commuting by bicycle are also growing, and San Francisco now ranks third in the nation behind Portland, Oregon and Seattle, Washington in bicycle commuting rates among major US cities. The potential for further increasing rates of bicycling is high – as Figure 21 shows, nearly 60 percent of all local automobile trips will be less than three miles in length by 2040, a convenient distance for bicycling.

Figure 21 Projected Auto Trip Lengths, 2040



The SFMTA and its partners are making rapid progress towards improving infrastructure. Since completion of the city's Bicycle Plan in 2009, 50 bicycle projects and nearly 30 miles of bicycle lanes have been added, along with more than four thousand shared lane markings (sharrows), hundreds of new bicycle racks, numerous innovative pilot projects such as the Green Wave on Market Street, and initiation of a regional bicycle sharing system in San Francisco.

These improvements are helping support the trend towards more and more bicycling, but are not sufficient to allow achievement of the aggressive goal – set by the San Francisco Board of Supervisors in 2010 – of achieving a 20 percent bicycle mode share by 2020. To grow bicycling further, San Francisco must do more to address cyclist safety. Surveys conducted for the SFMTA's 2012 State of Cycling Report indicated that almost half of those who do not currently bicycle say they are uncomfortable bicycling in mixed-flow traffic with cars, and only 13 percent said they feel safe from traffic when bicycling. At the same time, 94 percent of respondents say they would feel comfortable riding in bicycle lanes. Network fragmentation is also a challenge to improving cyclists' sense of safety. Many of the existing bicycle facilities are disconnected from one another (Figure 22), and cyclists may find it impossible to complete their whole trip on protected bicycle ways or bicycle lanes.

Figure 22 Bicycle Network Fragmentation

The SFMTA's recent Bicycle Strategy (2013) envisions a world-class bicycle facility network for San Francisco – one on which cyclists of all ages and abilities would be safe and comfortable. Full network build-out would include the following actions:

- Complete the bicycle plan (10 miles)
- Upgrade 200 miles of the existing bicycle network to premium bicycle facilities
- Construct 35 miles of new bicycle facilities
- Upgrade 200 intersections to accommodate bicycles
- Install 50,000 bicycle parking spaces
- Deploy and maintain a 3000+ bicycle / 300+ station bicycle sharing system. Support electric bicycles. This system was recently launched with the implementation of the Bay Area Bike Share Program in 2013, which includes an initial 700 bicycles and 70 stations throughout the Bay Area (including San Francisco).
- Provide supportive programs ($10m/yr).

CHALLENGES IN IMPROVING BICYCLING AND WALKING INFRASTRUCTURE

Many of the "easy fixes" to improve bicycling and walking infrastructure have already been completed or are underway. These include pedestrian crosswalk restriping, countdown signals, curb cuts, and striping of new bicycle lanes and sharrows.

Improvements that more significantly benefit bicyclists and pedestrians by physically separating them from vehicular traffic or by reducing vehicle traffic and speeds are frequently more challenging to implement, as they may require re-allocation of roadway space. These include road diets, widened sidewalks, and separated bike-ways, or signal timing changes such as more crossing time for pedestrians. Implementing these improvements requires political and community acceptance of parking or lane removal, or signal delays for vehicles.

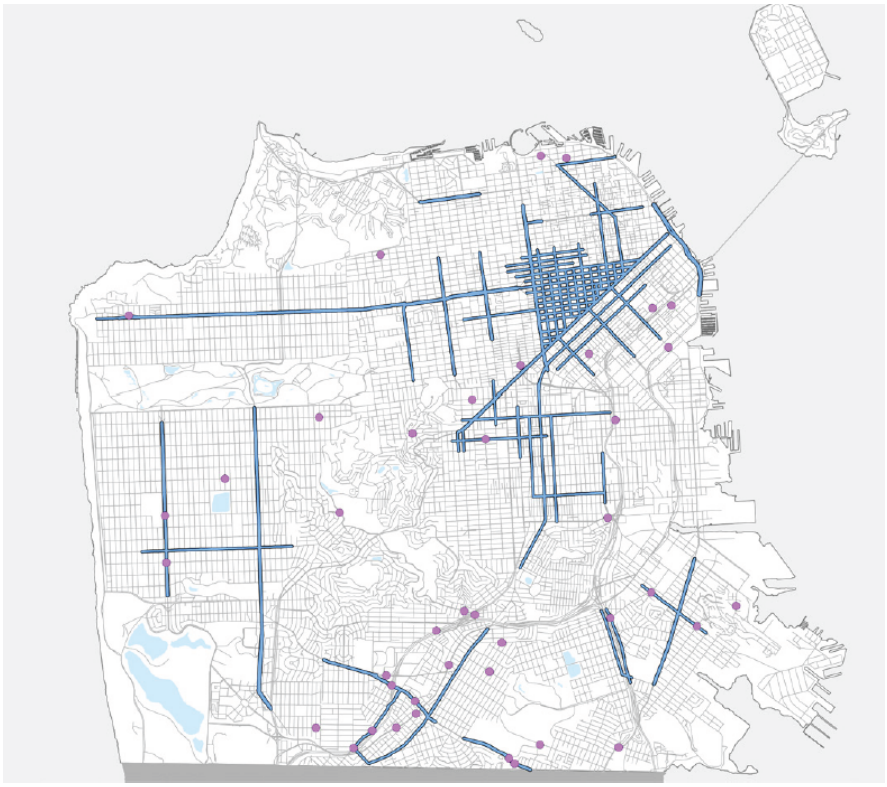
The SFMTA's Strategy estimates the total cost of this strategy to be approximately $600 million in year-of-expenditure dollars through 2040; most of this is unfunded.

4.2.2 | WALKING

San Francisco is a walking city, with nearly 20 percent of trips made by walking. The condition of the city's streets – whether noisy or calm, crowded or spacious, clean or dirty, safe or scary – greatly impacts how San Franciscans and visitors experience the city as they walk around, and is a major determinant of livability.

Although many of San Francisco's streets are inviting and pleasant, many are not, and some are inhospitable to pedestrians. This is evidenced by the fact that on average, 20 pedestrians are killed and 800 injured in collisions with motor vehicles every year.[32] In 2008, Gavin Newson initiated the Mayor's pedestrian safety task force and set a goal of reducing serious and fatal pedestrian injuries by 25% by 2016 and by 50% by 2021. The Task Force's report identified key sources of pedestrian danger, including speeding, failure to yield, and conflicts involving drivers making left turns, and identified 70 miles of the highest-injury corridors for pedestrians. These miles account for 60 percent of all pedestrian collisions in the city, and include most of the city's busiest arterial roadways (Figure 23).

Figure 23 High-Injury Corridors and Pedestrian-Injury Collisions



Source: SFMTA 2013.

Achieving the Mayor's goals will be a major challenge and will require high levels of investment in pedestrian infrastructure. The challenge is compounded by growing population and employment, which will bring an increase in walking trips, automobile trips, and pedestrian-automobile collisions unless aggressive action is taken.

[32] SFMTA Pedestrian Strategy, page 5

Aging of the population is another major challenge for pedestrian safety. San Francisco is projected to experience a 68 percent growth in the number of people 65 and older by 2040, making this group 20 percent of the population (compared to 16 percent today[33]). Older pedestrians are more likely to be killed when struck by an automobile.

Another notable recent effort to improve pedestrian safety and livability is the Better Streets Plan, which creates a unified set of standards, guidelines, and implementation strategies to govern how the city designs, builds, and maintains its pedestrian environment. The Plan seeks to balance the needs of all street users, with a particular focus on the pedestrian environment and how streets can be used as public space.

The Mayor's Pedestrian Safety Task Force report presented a vision for improving pedestrian safety and walkability in San Francisco. Key strategies referenced in the plan include:

- Upgrading the 44 miles of high-injury corridors to provide pedestrian safety features throughout
- Providing extra pedestrian crossing time at 800 intersections citywide
- Re-engineering streets around at least five schools and in 2 areas with high numbers of senior injuries annually
- Updating or creating at least nine plazas
- Re-opening 20 closed crosswalks
- Planning a city-wide network of 140 miles of green streets to help people walk safely to parks and the waterfront
- Upgrading 13,000 curb ramps
- Installing pedestrian countdown signals at 184 intersections by 2021
- Targeting enforcement of high-risk behaviors such as speeding and red-light running on high-injury corridors and intersections, and reporting quarterly on injury collisions and enforcement
- Pursuing state legislation for prioritizing sustainable transportation and targeted enforcement, such as speed cameras, congestion pricing, and vulnerable user laws

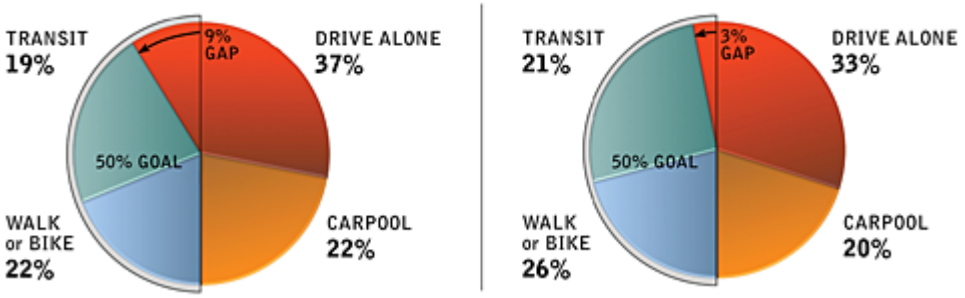
Full funding of the SFMTA Pedestrian Strategy would require approximately $600 million over the life of the SFTP; most of this is unfunded.

[33] Association of Bay Area Governments population projections

Livability: What Would it Take?

- **CHALLENGE:** San Francisco has a "Transit First" policy, yet under the Baseline almost 60% of trips in the city will be made by car (this includes carpooling). Such high levels of car use will have significant negative impacts on traffic safety, neighborhood cohesion, noise levels and other important aspects of urban livability.
- **TARGET:** Less than 50% of trips to, from and within San Francisco are made by car. Reaching this target means shifting approximately 430,000 trips daily in 2035 from cars to "Transit First" modes (transit, walking and biking).
- **IMPROVEMENTS:**
  - Transit projects that improve frequency or reliability or that reduce travel times, transfers or crowding; includes big-ticket items such as new rail lines and a second cross-bay tube for BART
  - Projects to promote walking, such as traffic calming, road diets, street closures and streetscaping
  - Projects to encourage bicycling, such as a network of cycletracks, more secure bike parking (including bike stations at major transit hubs) and bike sharing
  - In order to make it sufficiently different from other scenarios, this scenario did not incorporate congestion pricing
- **COST:** $15 billion.
- **RESULTS:** This scenario results in a shift in mode share from cars to "Transit First" modes of 6 percentage points compared to the Baseline scenario: the percentage of trips made by car decreases from 59% of all trips to 53% while the percentage of trips made by transit, walking and bicycling increases from 41% to 47% (see figure below).

Figure 1. Performance of Livability Scenario: 2035 Baseline (LEFT), Livability Scenario (RIGHT)



- **CONCLUSIONS:** The scenario makes significant progress toward its target but does not reach it. To achieve the target, an additional shift in mode share of 3 percentage points is necessary. That shift could be accomplished through congestion pricing: based on other analyses, congestion pricing would yield an additional shift in mode share from cars to "Transit First" modes of 3–5 percentage points.

5 Healthy Environment

SECTION SUMMARY:

- San Francisco has set aggressive goals for reducing greenhouse gas emissions from transportation; the goals would require 80 percent reduction in greenhouse gas below 1990 levels, which is five times more aggressive than regional greenhouse gas reduction goals.
- More stringent state vehicle emissions regulations will cause greenhouse gas emissions to fall by about 30 percent by 2040, but this is insufficient to achieve the goal.
- Some of the most promising strategies to achieve additional progress include congestion management, employer outreach, and partnerships with the private sector.

Transportation has significant environmental impacts. For example, emissions from cars and trucks account for one third of San Francisco's greenhouse gas emissions.[34] Addressing these impacts, particularly greenhouse gas emissions, is a key focus of the SFTP. This section reviews trends in greenhouse gas emissions, and discusses possible additional strategies that could help San Francisco achieve its goals, especially congestion management, employer outreach, and private sector partnerships.

5.1 | Goals and performance measures

The SFTP healthy environment goal focuses on minimizing the negative environmental effects of motorized transportation. Key performance measures include:

- Vehicle miles of travel
- Greenhouse gases associated with vehicle travel

5.2 | Trends and future conditions

Technology will do much to reduce climate change impacts from private vehicles. Tough state laws (Pavley I and II) regulating vehicle emissions are expected to reduce greenhouse gases by more than 40% compared to a business-as-usual scenario. However, this is not sufficient to allow San Francisco to achieve its goal of an 80% reduction below 1990 levels by 2050,[35] especially given the large amount of population and employment growth San Francisco expects to absorb. Additional, aggressive strategies will be needed to meet these goals.

[34] Brisson, Elizabeth, Elizabeth Sall, and Jeffrey Ang-Olson. "Achieving Goals of San Francisco, California, for Greenhouse Gas Reductions in Transportation Sector: What Would it Take?" Transportation Research Record: Journal of the Transportation Research Board. No. 2287, 2012, p89.

[35] From local ordinance 81-08. This is the amount climate scientists say is needed to stabilize the climate and prevent major sea level rise, extreme heat events, and other impacts.

Miles driven by private vehicles, or "VMT" (vehicle miles of travel) is the main source of greenhouse gases and air pollutants from the transportation sector. Growing population and employment in San Francisco and regionally is expected to result in a VMT increase of approximately 30% by 2040 under a business-as-usual scenario.[36] As shown in Figures 24 and 25, much of this VMT will come from the downtown core (for workplace VMT), and outlying southwest and southeast neighborhoods (for household VMT). The maps illustrate that major institutions such as medical centers and universities generate significant vehicle miles of travel.

PLAN BAY AREA: REGIONAL GREENHOUSE GAS REDUCTION GOALS

Plan Bay Area is the regional transportation plan developed by the Bay Area's regional transportation planning agency (the Metropolitan Transportation Commission). Approved in 2013, it sets a goal of reducing greenhouse gas emissions by 15% between 2005 and 2035, a statutory requirement of the California Air Resources Board.

Plan Bay Area shows how this reduction will be met by concentrating new growth in already built-up transit-accessible areas and through regional transportation investments and policies. Notably, San Francisco is expected to take on more new jobs than any other city, and more new housing than all other cities except San Jose. Concentrating jobs and housing in San Francisco supports efficient travel patterns and greenhouse gas reduction, but could also result in severe congestion and transit system crowding in downtown San Francisco unless major new system investments are made. See the Economic Competitiveness section for more detail.

[36] O:\Active Studies\CWTP Update\Data\Scenarios\Data\GraphicsSheets-E.xlsx Economic competitiveness. Includes VMT within SF only.

Figure 24 Household Vehicle Miles of Travel, 2040

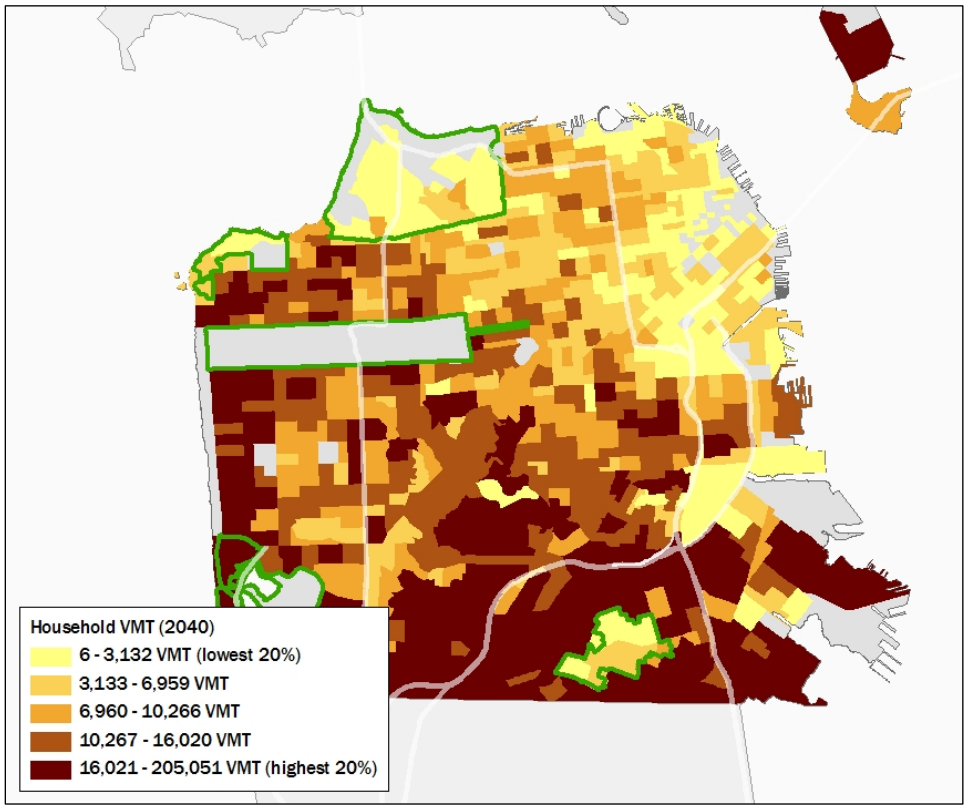
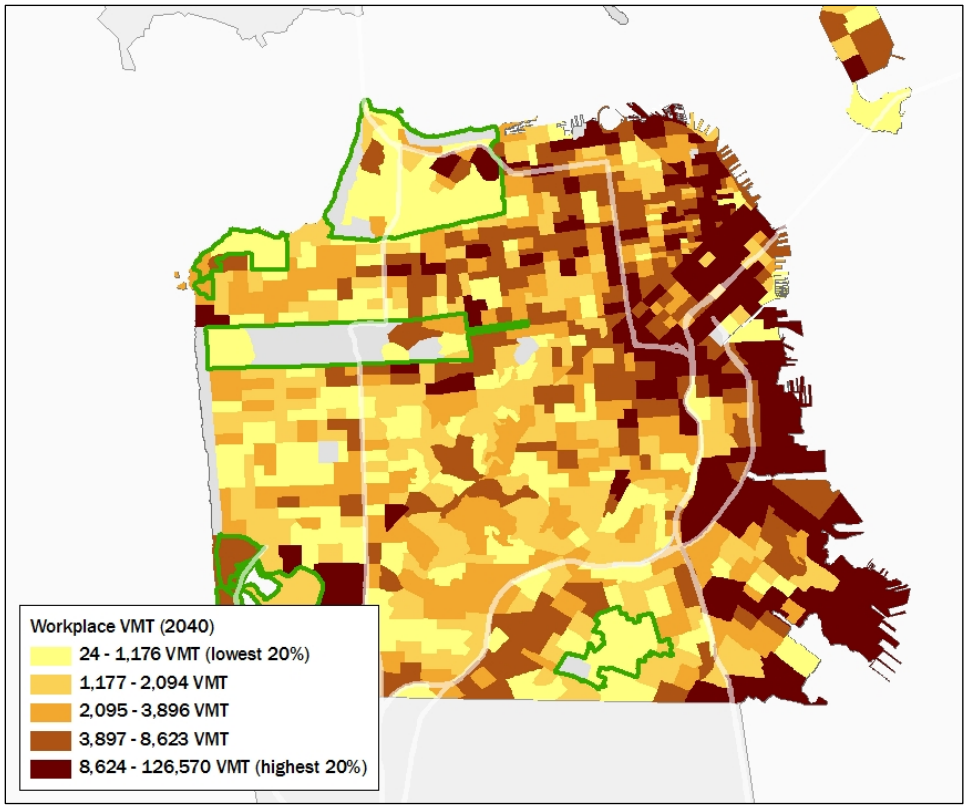
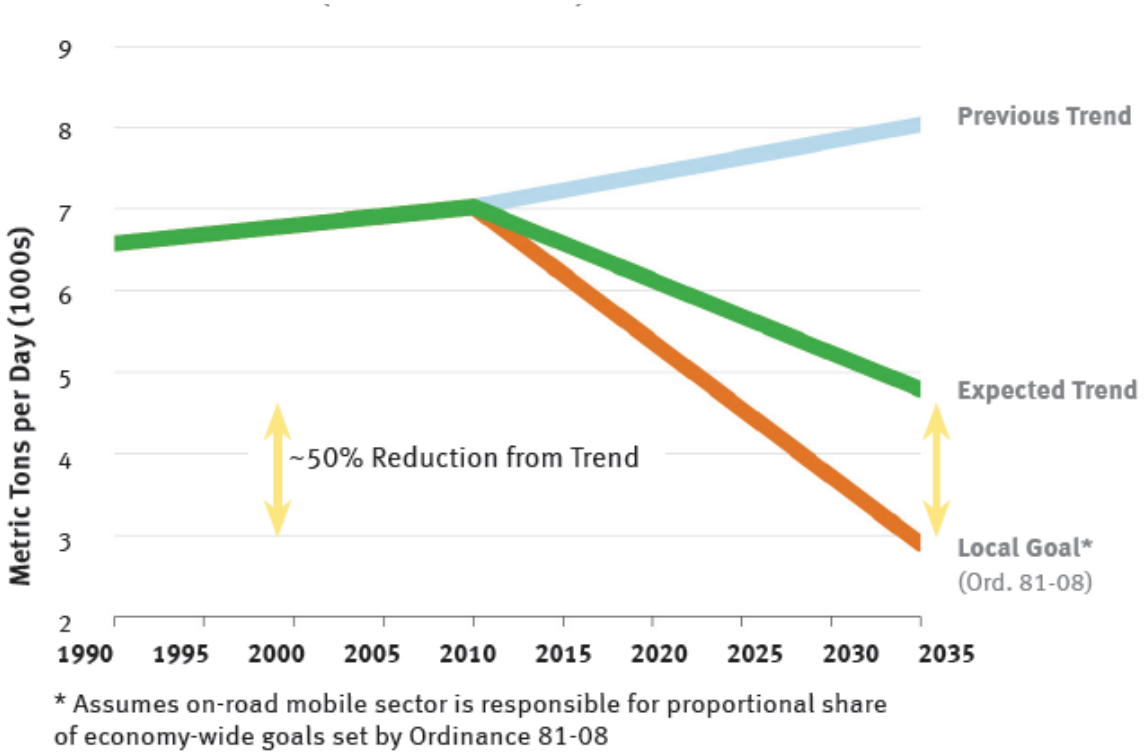


Figure 25 Vehicle Miles of Travel to Workplaces, 2040



Despite this VMT growth, greenhouse gases are expected to fall by about 30 percent between 2012 and 2040 due to the state emissions regulations described above. As shown in Figure 26, this will be insufficient to achieve the levels of GHG necessary to meet San Francisco's goals expressed in the city's Climate Action Strategy, which sets a very aggressive goal of reducing GHGs by 80 percent below 1990 levels by 2050, the reduction scientists consider necessary to stabilize the climate.[37] This goal is five times more aggressive than regional GHG reduction goals outlined in the One Bay Area Plan.

Figure 26 San Francisco Greenhouse Gas Reduction Goal Compared to Expected Trend



As described in the sidebar box above, the SFCTA conducted scenario testing to determine what it would take to achieve this goal. Multiple strategies were tested, focusing on road pricing, transit investments, and travel demand management activities. While even the most aggressive scenarios were insufficient to achieve San Francisco's goals, they allowed up to an 85 percent reduction relative to the expected trend.

The analysis also revealed which are the most cost-effective strategies for reducing greenhouse gases, namely congestion pricing, subsidized transit passes, and travel demand outreach programs. Investments in new mass transit services and electric vehicles were less cost-effective methods. The section below describes how the most cost-effective programs could be expanded and advanced in the future.

5.3 Approaches to achieving GHG reduction goals

This section describes three cost-effective approaches to reducing greenhouse gases in San Francisco: congestion management programs, outreach/incentive programs, and leveraging of private sector

[37] From ordinance 81-08.

investments. Ideas in this section are drawn from the city's Climate Action Plan and the Core Circulation Study (Appendix C).

5.3.1 | CONGESTION MANAGEMENT

Managing congestion through roadway pricing or similar means is one of the most effective tools available for reducing greenhouse gas emissions from transportation. One form of pricing already implemented in San Francisco is the SF*park* Program, which uses variable pricing on parking spots to reduce congestion (and associated greenhouse gases) associated with drivers searching for parking.

Another form of pricing has also been considered for downtown San Francisco. In 2010, the Transportation Authority published the Mobility, Access and Pricing study, which examined the feasibility of implementing a congestion charge for vehicles entering or leaving the northeast quadrant of San Francisco. The study found the following potential benefits of the program:

- 12 percent fewer peak-period vehicle trips
- 21 percent reduction in vehicle hours of delay
- 5 percent reduction in greenhouse gases citywide
- Increase in transit speeds of 20-25 percent
- Reduction in pedestrian incidents of 12%
- Generation of $60-$80 million in annual net revenue for mobility improvements

On December 14, 2010, the Transportation Authority Board unanimously approved the MAPS Final Report and voted 8–3 in favor of pursuing additional study of the concept.

Vehicle travel can also be limited through regulation. For example, a 1998 ordinance implemented in Cambridge, Massachusetts, requires any employer who expands available parking by more than five spaces to develop a plan for limiting vehicle trips to the worksite through employee incentives, parking pricing, technology, or other means. Implementation of the plan is enforced by the city and employers must demonstrate through surveys and driveway vehicle counts that they are not exceeding their vehicle trip allowance. The program has reduced vehicle miles of travel by 24 percent between 2000 and 2010, and has successfully allayed community concerns regarding traffic impacts from new development.

5.3.2 | INCENTIVE PROGRAMS AND OUTREACH

Incentive and outreach programs can also be a cost-effective method of reducing private vehicle travel and associated environmental impacts. Programs that involve personal interaction, monetary incentives, and tailored information are particularly effective in supporting behavioral change. One example is King County, Seattle's "In Motion" program, which involves provision of targeted marketing materials to encourage alternatives to driving paired with free transit passes to neighborhoods in King County on a rolling basis. Since 2004, about 13,000 residents have participated, and follow-up surveys indicate that vehicle miles of travel have been reduced by 2.4 million miles. Crowding on San Francisco's transit vehicles (covered in Section 3) and budget shortfalls make widespread provision of free transit passes impractical, but other types of incentives can be explored.

TRAVEL DEMAND PARTNERSHIP PROGRAM

The San Francisco Travel Demand Partnership Program is an innovative inter-agency effort to pilot test several innovative approaches to managing greenhouse gas emissions from transportation. Pilot projects include employer ridesharing and shuttle programs, a sustainability marketing campaign, and a flexible employee benefits program designed to reduce solo commuting. These pilot programs will inform development of the next generation of travel demand management strategies in San Francisco. The program is being funded through the Metropolitan Transportation Commission's Climate Initiatives Program.

5.3.3 | PRIVATE SECTOR TRANSPORTATION SERVICES AND TECHNOLOGY

Another approach to cost-effectively reducing greenhouse gases is to leverage private sector investment. In recent years, the private sector, and the technology sector in particular, have become more active in the transportation sector, both by providing direct transportation services to their employees in San Francisco, and by creating new services and technologies to serve the general public. Many of these innovations have significant potential to reduce single occupancy vehicle trips and greenhouse gases. Examples include:

- **CAR-SHARING AND SCOOTER-SHARING -** Private car-sharing companies have expanded rapidly, with multiple companies such as Zipcar, CityCarshare, Getaround, and the scooter-sharing company Scoot now offering services in many neighborhoods. Some companies, like Getaround and Relayrides, allow private vehicle owners to share their personal vehicles with others. Studies have indicated that access to car-sharing vehicles can allow residents to reduce the number of vehicles owned[38], which can support reductions in driving and associated greenhouse gas emissions. When car-sharing is offered at the worksite, it can also support employees who want to avoid driving to work but need access to a car during working hours.
- **RIDE-MATCHING -** Technological advances are allowing people to share rides more easily. Many private vendors are now offering customizable software programs that employers can offer to their employees to help them identify co-workers with similar travel needs – examples include Zimride, ride Amigos, rideShark, Greenride, TwoGo, and many others. Another set of companies, including Lyft, Uber, and Sidecar, have developed smartphone applications that allow drivers to find potential riders in exchange for a donation.
- **PRIVATE EMPLOYER SHUTTLES -** Many of the larger technology sector employers, such as Google and Genentech, are now offering private shuttles for their employees' commutes. Surveys have indicated that shuttles are serving about 35,000 commute trips per day, or about 1 percent of all trips to, from, and within San Francisco. About half of riders indicate they would drive alone if the shuttle were not provided.

[38] Martin, E., Shaheen, S., Lidicker, J. Carsharing's Impact on Household Vehicle Holdings: Results from a North American Shared Used Vehicle Survey. 2010 Transportation Research Record, March 15, 2010.

The public sector can play a key role in supporting growth of these services while minimizing any negative impacts on the transportation system. Some examples of possible roles the public sector can play include:

- **ADOPTING REGULATORY POLICY THAT SUPPORTS GROWTH IN PRIVATE SECTOR TRANSPORTATION SERVICES.** One such effort is the Shuttle Partners Program, a pilot program within the TDM Partners Project described previously. The program would allow private employer shuttles access to select MUNI stops in exchange for a fee. Successful implementation of this program will clear a path toward expansion of the private shuttle sector while addressing community concerns around shuttle impacts. Another example is the city planning department's policy of allowing developers to purchase residential car-share accounts to justify exceptions to maximum parking allowances.
- **ALLOWING PRIVATE SERVICES ACCESS TO STREET SPACE.** In July 2013 the SFMTA adopted a formal policy to guide the agency's facilitation of car-sharing in its off-street parking lots and garages, as well as approving a two-year pilot to test the use of on-street parking spaces as car-share spaces ("pods"). This pilot builds on lessons learned from a small-scale pilot of on-street car-share pods carried out in 2011 and 2012, and will make as many as 900 on-street parking spaces available across all districts of the city for use by qualified car-share organizations over the two years of the pilot.
- **SUPPORTING MARKETING OF PRIVATE SERVICES.** City staff can aid in the marketing of private sector services that support sustainability goals by incorporating information on these services into marketing materials provided to employees, and on city web sites.

Healthy Environment: What Would it Take?

- **CHALLENGE:** The city has an ambitious official policy to reduce emissions of greenhouse gases to 80% below 1990 levels by 2050. However, the large number of new residents and workers anticipated for San Francisco in coming decades will greatly blunt the impact of even such effective measures as the state's "Pavley Law," which tightens fuel-economy standards for cars and light trucks.
- **TARGET:** To reduce the city's transportation-related emissions of greenhouse gases by 2035 to 2,900 metric tons daily below the post-Pavley trend (this translates the city's official policy to the SFTP's horizon year and to the percentage contributed by transportation sources to total emissions).
- **IMPROVEMENTS:** This scenario included the projects, programs, and policies identified below. An additional, more aggressive sensitivity analysis was also conducted incorporating a regional road-pricing strategy that doubles the operating cost for a car and estimates a penetration rate for electric vehicles of 25%.
  - Increased penetration of electric vehicles into San Francisco's private-vehicle fleet to 9–16%
  - A $6 congestion-pricing toll in downtown San Francisco during peak periods
  - New designated transit lanes and rail extensions
  - Employer-subsidized transit passes and additional employer-based TDM measures
  - Mandatory transit passes for new housing units and other residential TDM measures, including personalized outreach on commute alternatives and increased car-sharing
  - Bicycle improvements, including a network of cycle tracks
  - School-based TDM measures, including Safe Routes to School-type investments, and outreach and other tools to facilitate carpools and school-pools, at both primary and secondary schools
- **COST:** $10 billion ($4 billion excluding second cross-bay BART tube and high-speed rail service).
- **RESULTS:** The basic scenario reduces post-Pavley emissions by 1,600–1,800 metric tons daily (see chart below). With the aggressive sensitivity analysis, the reduction is 2,200–2,600 metric tons daily.
- **CONCLUSIONS:** The basic scenario falls well short of its target even with the most aggressive measures. It is worth noting that each improvement analyzed presents trade-offs in terms of performance, cost-effectiveness, political acceptability, and co-benefits. Electric vehicles, for example, reduce emissions very cost-effectively but lack the co-benefits of strategies aimed at reducing car travel, such as reducing congestion or improving traffic safety. These tradeoffs were considered in the evaluation of improvements for inclusion in the preferred and vision alternatives.

6 Visitor, Goods Movement, and School Transportation Needs

SECTION SUMMARY:

- Of the thousands of people who visit San Francisco every day, more than 25 percent are from the Bay Area, and many of these visitors drive. Reducing this group's reliance on automobile travel could have a significant impact on congestion in the northeast core, where many visitor trips end.
- Increasing congestion could have an impact on goods movement, delaying delivery vehicles and causing inconveniences and economic hardships for delivery recipients. A combination of citywide congestion-mitigation programs and neighborhood-level parking-management strategies will be required to solve this problem.
- Reliability, safety, and other factors prevent students from taking transit to school instead of getting a ride from a parent.

The prior sections discussed the transportation investments necessary to make progress towards the SFTP goals of world-class infrastructure, economic competitiveness, a healthy environment, and livability,. This section discusses the transportation needs of three important constituencies whose needs do not fit neatly within the SFTP goal areas: visitors, companies moving goods through the city, and students.

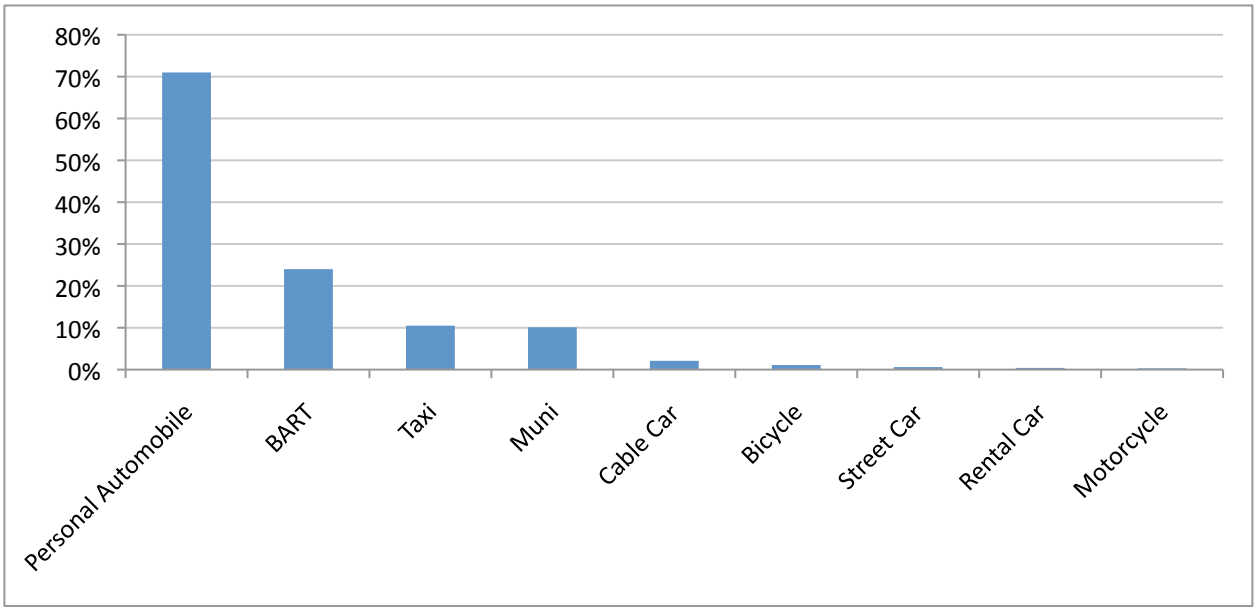
6.1 | Visitors

The San Francisco Convention and Visitors Bureau estimates that approximately 131,000 people visit San Francisco every day,[39] generating an estimated 500,000 miles of daily vehicle travel[40]. While this is far less vehicle travel than generated by daily commutes, it can still contribute to intense congestion as it clusters in specific times and places, such as around popular tourist sites, for major sports events, and during Sunday afternoons.

Visitor travel is concentrated in the city's congested northeast core, and as Figure 27 shows, many visitors from the Bay Area, who make up nearly a quarter of all visitors, come to the city by car.[41] Shifting them to other modes will be critical in reaching the San Francisco Transportation Plan's goals.

[39] San Francisco Convention and Visitors Bureau. "San Francisco Visitor Industry Statistics." Retrieved from http://www.sanfrancisco.travel/research/ on 10/7/13.
[40] Estimate assumes each visitor makes 4 trips per day; about 30 percent of trips are by automobile; and trips are three miles in length.
[41] San Francisco Convention and Visitors Bureau. "Visitor Profile Research." Presentation, January-September 2010. Slide 14.

Figure 27 Bay Area Residents' Mode of Travel to San Francisco for Day Trips



Source: San Francisco Convention and Visitors Bureau, 2010.

While visitors from further away have more varied travel patterns, they still center on the automobile. Seventy-six percent of international visitors and 61 percent of domestic visitors travel by taxi or rental car.

Some potential strategies for addressing congestion associated with visitor demand include:

- Distributing transportation information and, potentially, Clipper cards, to hotels. The SFMTA has already begun outreach to hotels and convention centers.
- Working with major event venues to manage demand, such as through advertising alternatives and facilitating shared rides or taxis to events.
- More clearly identifying designated areas for tour bus loading and unloading.
- Providing additional transit services in areas with the highest tourist demand, where appropriate.
- Piloting direct bus services from Bay Area locations to major San Francisco attractions not readily accessible by transit to serve high demand from Bay area visitors.
- Working to deploy bicycle sharing at the most visited locations.

6.2 | Goods Movement

Goods movement is critical to San Francisco's economic competitiveness and livability, two of the San Francisco Transportation Plan's four goal areas. Problems with goods movement in today's transportation

system center on delivery vehicles' competition with private automobiles for space on city roads and at the curbside.

In Spring 2011, the SFTP team conducted eight interviews with a variety of goods movement stakeholders, including merchants, delivery companies, and drivers, the United Parcel Service, and the San Francisco Municipal Transportation Agency. The conversations revealed a number of related issues that impede efficient deliveries:

- **INSUFFICIENT SPACE FOR LOADING AND UNLOADING.** Though yellow curb zones reserve some space for deliveries, delivery vehicles often must compete with cars, large employer shuttles, and other vehicles to drop off goods at local businesses. When there is no curbside space available, drivers double park or must take additional time to cart deliveries from more distant parking spots.
- **POOR MANAGEMENT OF AVAILABLE LOADING AND UNLOADING SPACE.** Stakeholders noted that loading and unloading zones are often too short, poorly placed, have inadequate hours, and are poorly enforced.
- **CONGESTION DURING PEAK TRAVEL PERIODS.** Many delivery-vehicle destinations are in the densest parts of the city, where traffic congestion is the biggest problem. For such vehicles, slower deliveries mean less productivity and, ultimately, lost money.

Shorter-term strategies to remedy these issues include continually refining and rationalizing the hours of yellow zones and determining locations through a community process. Delivery spaces should also be an additional consideration in crafting neighborhood plans.

In the longer term, congestion management strategies can support more efficient goods movement. As described in the Environment section, forecasts show that pricing will significantly reduce congestion in the city's dense northeast core, the destination of many deliveries and the area of the city in which competition between drivers and delivery vehicles is most intense

6.3 | School Transportation

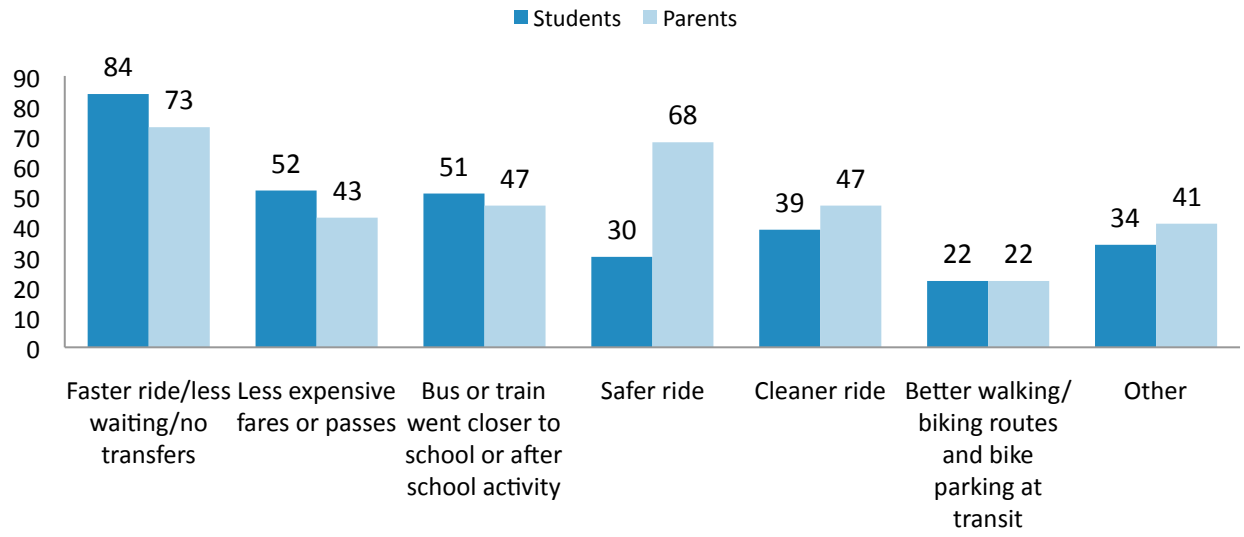
Outreach for the SFTP (described fully in the SFTP Appendix E: Outreach Summary) included a survey of students and parents to gauge their transportation needs. The survey asked participants about factors that hold them back from taking transit, biking, or walking to school (or, in the case of parents, allowing their students to take those modes). More than 1,000 responses were received, and results revealed that the frequency and reliability of transit service is the top priority of students and parents. For students, reduced-price transit passes and transit stops closer to school were also important but significantly less so. For parents, transportation safety was another key area of importance (Figure 28).

The survey findings reveal that the top school transportation needs can be met through projects and programs designed to improve transit service quality, especially those that would serve major educational institutions. Sections 2 and 3 discuss current efforts and possible future strategies to improve transit service.

In addition, other efforts are already underway to support non-auto school transportation. In late 2012, the Board of Supervisors funded a short-term youth-pass pilot to provide students with free Muni passes, more

than 18,000 students signed up for the program in the months before it officially began, in March 2013.[42] The pilot will continue for 16 months. The program was developed in response to cuts in San Francisco Unified School District's yellow school bus service and recent increases in the cost of Muni youth passes.[43]

Figure 28 Priority School Transportation Concerns of San Francisco Students and Parents



Source: SFCTA School Transportation Survey. Numbers indicate number of respondents who marked the issue as being of importance.

[42] Cabanatuan, Michael and Neal J. Riley. "18,000 youth sign up for free Muni pass." *San Francisco Chronicle*, February 7, 2013. Retrieved from http://www.sfgate.com/bayarea/article/18-000-youth-sign-up-for-free-Muni-pass-4261349.php on 10/15/13.

[43] Ciria-Cruz, Rene. "Youth Score Win for Free MUNI Passes." Retrieved from http://urbanhabitat.org/19-2/ciria-cruz-TJ on 10/15/13.

Appendix C

CORE CIRCULATION STUDY

Recognizing that a large share of San Francisco's future growth is planned for the city core (downtown, South of Market, and Mission Bay Neighborhoods), we undertook a study of current and projected circulation patterns in the core as part of SFTP development. The study resulted in a paper accepted for publication at the Transportation Research Board 2014 annual conference (attached). Study findings informed the SFTP Investment Plans and policy recommendations.

PREVENTING CARMAGEDDON IN SAN FRANCISCO'S RAPIDLY DENSIFYING CORE

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ABSTRACT

Several land use and transportation plans propose changes that would affect the "Core" of San Francisco. The Core encompasses the greater Downtown area, including the South of Market (SoMa) neighborhood. SoMa is currently comprised of a predominantly one-way street grid with long blocks of multi-lane arterial streets designed to carry traffic from Downtown to the city's major regional freeway access points. With at least 48,000 housing units and 122,000 more jobs expected in this area, San Francisco has developed plans to aggressively reduce number of general purpose travel lanes on many streets to improve livability and better balance travel options amongst modes. This paper presents analysis and findings of an effort to use quantitative analysis to identify the cumulative transportation performance effects of these proposed changes. The paper presents a combination of activity-based travel demand model, traffic microsimulation, and off-model analysis to describe one of the key problems identified – that plans for the Core could lead to a "carmaggedon" scenario (i.e perpetual gridlock) where the forecast level of auto demand "breaks" the Core network—a particular problem because of the negative impact perpetual gridlock would have for transit operating at-grade. A range of strategies to reduce auto demand are evaluated for their effectiveness, finding that demand management and mobility improvement strategies are essential. The paper closes with two key discussion areas: 1) opportunities and challenges to making transit, walking, and cycling function effectively in extremely congested conditions; 2) a need for the city evolve from the typical forecasting/analysis approaches to long-range transportation planning to solve tomorrow's transport challenges.

INTRODUCTION

To see an example of how traffic congestion impacts other modes of transportation today, you only need to stand for a moment on a street in Downtown, San Francisco during rush hour. You will likely see private autos illegally trespassing in unprotected bus lanes. You will see 50+ passengers on a bus waiting for a single motorist to make a right turn through a pedestrian-filled intersection. You will see frustrated motorists block intersections because they have already waited too long to cross. You will see cyclists risking their lives navigating the slim and unpredictable gaps between vehicles. This problem—of congestion, and its negative travel time, reliability, and safety impacts to all modes of transportation—has been of particular interest to San Francisco given plans underway to rapidly intensify land uses while reducing the number of general purpose travel lanes on many streets to increase livability. Given this context, the City has struggled with questions such as: how much can auto congestion's impacts on other modes be mitigated by simple low-cost solutions or are major capital investments needed? Can we, and/or should we strive to mitigate congestion? What level of intervention is needed to maintain a safe, habitable urban environment while providing sufficient mobility to maintain the City's economic competitiveness? This paper explores these challenging questions and analyzes potential solutions.

BACKGROUND

San Francisco is a city recognized for its leadership in planning for transit-oriented growth. The City's Charter even has a Transit First policy that states that, "decisions regarding the use of limited public street and sidewalk space shall encourage the use of public rights of way by pedestrians, bicyclists, and public transit."*(1)* The City's currently adopted or underway land use plans call for a significant increase of 48,000 housing units and 122,000 jobs within the city's Core *(2)*. The city has made planning for this growth a policy priority. In addition, the Bay Area region (population of approximately 7 million) looks to San Francisco, as well as the other core cities of the region (Oakland and San Jose) as the most important locations to focus most growth due to the existing infrastructure and density within these locations. In fact, in the recently adopted *Plan Bay Area* long-range land use and transportation plan., San Francisco is expected to take on approximately 92,000 housing units and 190,000 jobs to help achieve the region's greenhouse gas reduction goals (*3*). Citywide, this expected growth represents approximately a 25% increase in housing and a 34% increase in jobs, relative to today's levels citywide.

Within this context, San Francisco has placed emphasis on planning for growth within the "Core" of the city, generally those areas adjacent to the Downtown/Civic Center job centers. Combined, approximately 60% of growth in housing units and 85% growth in jobs has been planned to be accommodated in the Core, with a lot of it focused in the neighborhoods directly south of Downtown: the South of Market (SoMa) and Mission Bay neighborhoods *(4)*. SoMa is known for its multi-lane one-way arterial streets that provide access between Downtown and the regional freeway network. As a result of the needs of existing SoMa residents, as well as in response to growth planned, there have been significant efforts to develop and implement plans to increase the neighborhood's livability by re-purposing right-of-way of general purpose lanes to provide safer, more attractive non-motorized facilities and faster, more reliable transit. Mission Bay, just south of SoMa is a redevelopment area with a research and heath-care oriented master plan in the process of building out, and separated from SoMa by a channel to the Bay, with only two streets connecting north-south to SoMa (see Figure 1).

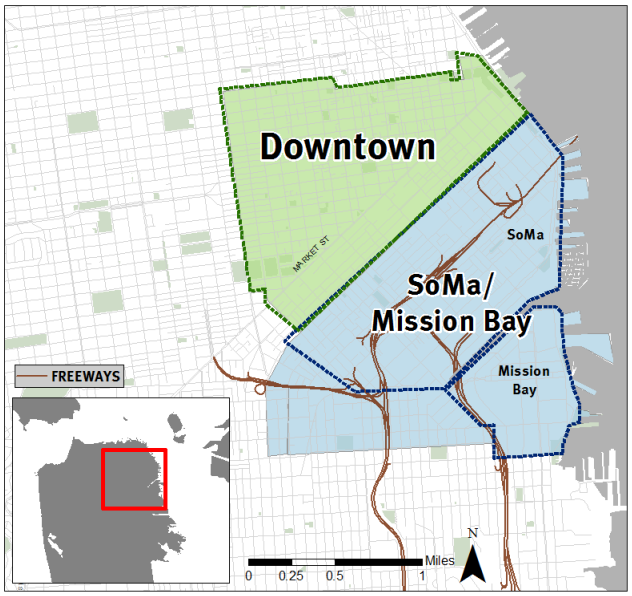

FIGURE 1 Core Study Area

The San Francisco County Transportation Authority (Transportation Authority) undertook a focused study of the Core to inform the 2013 update to the San Francisco Transportation Plan (SFTP), San Francisco's long-range, countywide transportation plan that prioritizes transportation investments and recommends policies to support the city's transportation goals. The purpose of this analysis, known as the Core Network Circulation Study (Study) was to analyze the cumulative impact of growth and

changes to the transportation network; identify transportation performance problems; and propose recommendations.

The analysis revealed three key problems: 1) the forecast increase in auto trip-making caused by the intensifying land use would result in more auto demand than could be served, in particular given concurrent projects to promote livability through reducing private vehicle capacity—in other words, if the demand for vehicle travel forecast were realized, a perpetual gridlock or "carmageddon" scenario was expected given current plans; 2) even if auto demand was to be substantially reduced, significant transit performance challenges remained; and 3) the overall increase in trips of all modes would exacerbate multi-modal conflicts endangering the safety of pedestrian and cyclists. The purpose of this paper is to describe the methodology, findings, policy implications, limitations, and conclusions related to the first problem (the problem of "carmaggedon").

METHODOLOGY/ANALYSIS APPROACH

The Study's approach to identifying problems relied on an evaluation framework that included metrics related to performance of each mode of transportation, including transit, walking, cycling, and private vehicle travel. The analysis proceeded in three phases: first, a baseline **travel market analysis** was conducted to understand who is traveling in the Core, in particular which high auto trip markets affected the Core; next, transportation performance was assessed and problems identified, including the problem that is the focus of this paper, forecast **perpetual gridlock congestion** during peak hours; finally, **effectiveness of strategies** to respond to problem areas were identified and evaluated.

Two main scenarios were considered to inform the analysis: a "Base" year, representing current conditions, and a "Planned Future" horizon, that included all land use and transportation network changes planned for in the 2035-2040 timeframe. The study team chose the PM peak hour as representative of a typical daily "worst case" scenario.

A variety of analysis tools were used including:

- The Authority's activity-based travel demand model, the San Francisco Chained Activity Modeling Process (SF-CHAMP) *(5)*. SF-CHAMP incorporates a state-of-the-art approach to forecasting travel demand, sensitive to a broad array of conditions that influence travelers' choices. It incorporates the most recent 2010 Census household travel data, along with calibration to observed data including traffic volumes and transit ridership.
- Micro-simulation traffic analysis software, SimTraffic, which was used to determine how the level of auto trip-making demand forecast in SF-CHAMP would affect on-the-ground performance during PM peak hour conditions. As compared to SF-CHAMP, SimTraffic better accounts for delays under congested conditions and represents more detailed network characteristics such as traffic signal phasing, coordination, turn lanes, and the effects of queuing between intersections.
- Off-model techniques customized to understand the effectiveness of strategies that are not currently represented in SF-CHAMP or SimTraffic. These methodologies are summarized in the following section alongside descriptions of the strategies considered. More detailed documentation is available as a technical appendix *(6).*

FINDINGS

This section presents findings from each of the three phases of the analysis: travel markets, transportation performance problems, and effectiveness of strategies.

1. Travel Markets

The Travel Market analysis investigates the purpose and characteristics of travel in the Core during PM peak hours including: travel mode, common origins and destinations, and breakdown between trips passing through versus originating or destined to the Core. This was a focus, as understanding the major and changing travel markets would inform which strategies would most effectively respond to problems identified.

Figure 2 summarizes overall trip-making levels in Downtown and SoMa/Mission Bay today and in the Planned Future using SF-CHAMP model output for each scenario. SoMa/Mission Bay is responsible for most of the growth in trip-making—about twice as many in the

FIGURE 2 Trips to/from/within Downtown and SoMa/Mission Bay: Base vs. Planned Future, pm peak
Source: SF-CHAMP 4.3, Focused Growth

Planned Future than today. However, Downtown still attracts the most total trips. As shown in Figure 3, nearly all the new auto trips to or from the Core in the future are generated by SoMa/Mission Bay.

Figures 2 and 3 show travel occurring to, from, or within the Core, but many other trips pass through the Core without starting or ending there. Figure 4 includes this larger universe of trips and breaks down trips between those that start or end somewhere else within San Francisco (i.e. local), versus those that are regional and have their other end in another Bay Area county. Viewing trip ends and through trips together indicates that over half of the vehicles traveling on the SoMa street network are not going to a destination in SoMa; and, of the trips which pass through, half are local to San Francisco and half have regional destinations. Figure 4 also shows that the share of trips destined to or from this part of the City is increasing, while the share of trips passing through this area is decreasing, potentially indicating that as this part of the city densifies, the local streets are used by more core-related traffic, crowding out vehicles destined to other parts of the City.

FIGURE 3 Change in Trips to/from/within Downtown and SoMa/Mission Bay: 2010-2035, pm peak
Source: SF-CHAMP 4.3, Focused Growth

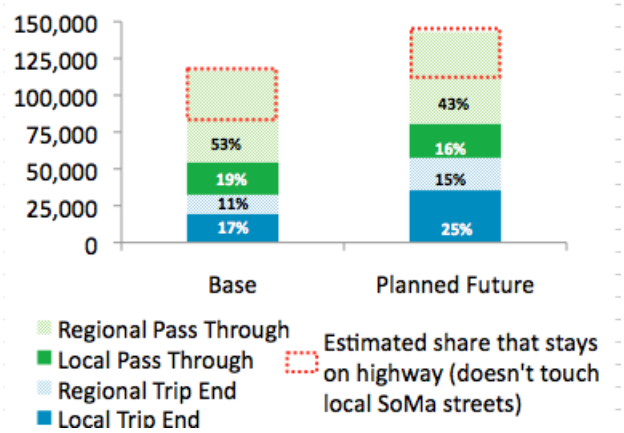

FIGURE 4 SoMa Auto Trips, Pass-Through vs. Trip Ends, Regional vs. Local, pm peak
Source: SF-CHAMP 4.3, Focused Growth

The Study team executed additional analysis focused on short auto trips, due to their greater potential to shift to walk and bicycle trips. Figure 5 shows "sub-areas" that were the focus of the analysis, as well as the number of short auto trips under 2 miles and under 0.5 miles in the Planned Future and the change relative to today.

In the aggregate, PM peak auto trips less than two miles more than double (233% increase) from today to

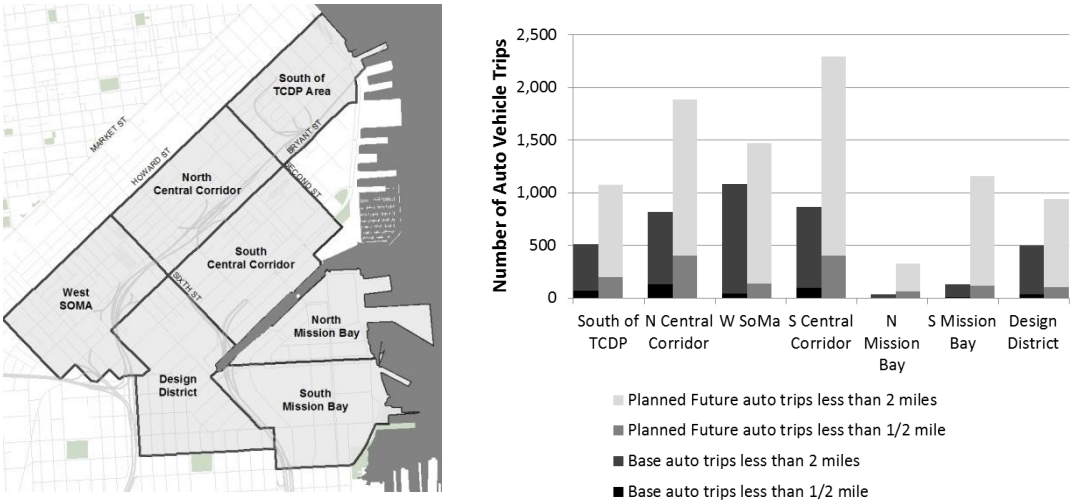

FIGURE 5 Short Auto Trip Analysis: Study Area, and Change in Auto Trips Under Two Miles, 2011 vs. 2035 Baseline
Source: SF-CHAMP 4.3, Focused Growth

the Planned Future. The auto mode share of trips less than two miles actually *decreases* (20% to 17%), yet the share of auto traffic in SoMa/Mission Bay that is completing a trip less than two miles *increases* (18% to 20%). In the context of an overall increase in trip-making, this means a lower percentage of people are choosing to drive for short trips, yet, more vehicles on the network are completing short trips due to changes in land use and density. Many of these short auto trips are likely a result of trip-chaining, which the Study team considered as it developed the strategy response (described in Part 3 of this section). The implication is that transportation demand management (TDM) strategies should be pursued to discourage people from arriving via automobile in the first place, allowing these short auto trips to more easily be shifted to walking and bicycling trips. By encouraging transit, shuttle use, ridesharing, parking policy, and other TDM measures people will be less likely to drive to these districts in the first place, and thus decreasing the possibility of short auto trips. Shifting to walking and cycling is a particular opportunity not only for short vehicle trips but also for short transit trips, which would free up room on overcrowded buses and trains for longer transit commutes.

2. Transportation Performance: Congestion Reduction to Avoid Gridlock

The study team analyzed the auto and transit performance impacts of the forecast increase in net auto travel in the Planned Future. The Study team prepared a SimTraffic microsimulation analysis, assuming the transportation network proposals (i.e. reduction in general purpose travel lanes) were in place, for a subset of SoMa that experiences some of the greatest levels of congestion today. The purpose of this analysis was to determine how much auto demand reduction would be necessary to prevent vehicle queues from spilling into upstream intersections and maintain a saturated, but flowing network. Results determined that an approximate 26% reduction of auto volumes during the PM peak period relative to Planned Future SF-CHAMP forecasted levels of demand was needed to reach an operational point at which traffic could flow (see Figure 6). In other words, the Core San Francisco road network can only accommodate about half of the forecasted auto demand increase before creating a perpetual gridlock condition.

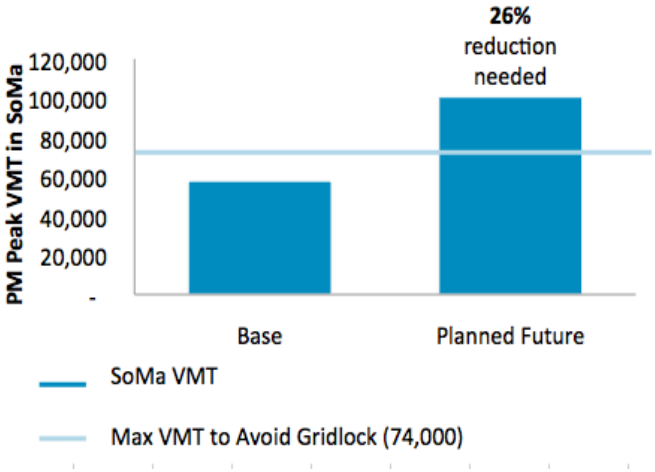

FIGURE 6 PM Peak Vehicle Miles Traveled on SoMa Streets: Comparison of Scenarios *Source: SF-CHAMP 4.3, Focused Growth*

3. Congestion Reduction Strategy Effectiveness

The final aspect of the analysis was to assess the effectiveness of a range of strategies in contributing to achieving the 26% reduction in PM peak VMT needed. Informed by the trip analysis findings, a set of potential strategies were identified for analysis.

Generally, strategies were identified in line with those that responded to a larger needs analysis conducted for the SFTP. In particular, there was a focus on newer and innovative demand management strategies that have

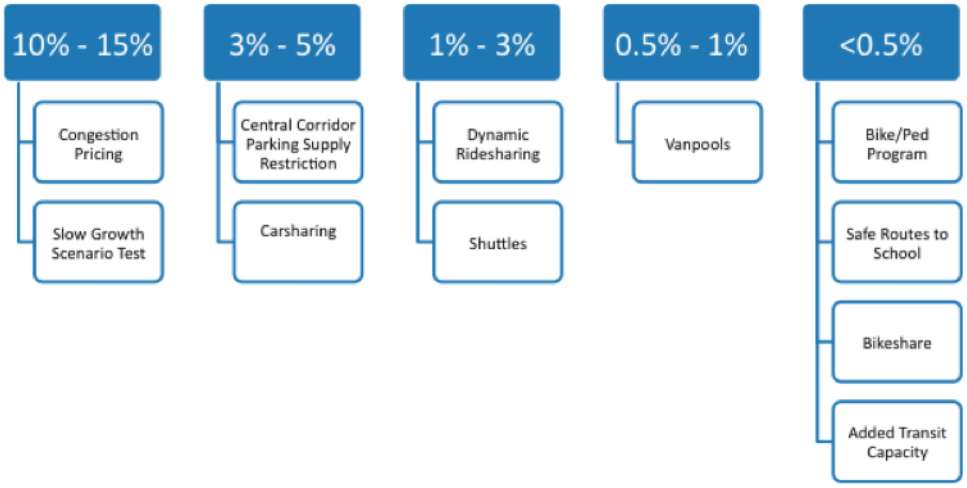

FIGURE 7 Relative Effectiveness of Strategies to Reduce PM Peak SoMa VMT
Source: SFCTA, 2013.

recently come into practice or are under consideration in San Francisco.

Figure 7 summarizes the range of potential impacts of selected strategies to further reduce core VMT from the Planned Future (each strategy listed could individually provide the level of reduction—e.g. congestion pricing and slow growth could each provide a 10-15% reduction in PM peak SoMa VMT). Results found that no single strategy alone could achieve the level of reduction needed, and even all strategies combined may not be able to. The rest of this section contains definitions of each strategy represented as well as the methodological approach to quantify the benefit. It should be noted that the impacts of these strategies are not additive: each strategy is evaluated assuming that no other strategies are implemented. Overlap is likely although in some cases synergies between strategies are also possible.

10% - 15% VMT Reduction

Congestion Pricing: The reduction estimate for congestion pricing is based on travel forecasts conducted as a part of the Mobility, Access, and Pricing Study that explored the feasibility of implementing congestion pricing in Downtown San Francisco (*7*). The 10-15% reduction represents the AM/PM Northeast Cordon scenario, where motorists would be charged a $3 per crossing fee for crossing into or out of the area bounded by Laguna Street, Guerrero Street, 18th Street, and the waterfront during peak periods with net revenue reinvested in multi-modal mobility improvement. Such a policy is still under consideration for San Francisco, and has recently come back into policy and media attention in context of major growth planned in the Core and the resurgence of San Francisco's economy after the recession.

Slow Growth Scenario Test: This scenario test was intended to be a point-of-information were San Francisco's growth to happen at a slower pace, akin to the level of growth forecast for 2020. Under this slower growth scenario, PM peak VMT would need to be reduced by 11%. Of course, growth would continue towards 2040 projections and further reduction strategies would ultimately be needed to avoid perpetual gridlock.

3% - 5% VMT Reduction

Central Corridor Residential Parking Supply Restrictions: This strategy describes results of a model scenario in SF-CHAMP representing the effect of a set of policies that would aggressively limit the growth of parking supply in a part of SoMa known as the Central Corridor (bounded by 2nd, 6th, Mission, and Townsend Streets). The Central Corridor is currently undergoing a planning process to upzone the area as it is adjacent to the route of a major transportation investment (the Central Subway that will connect Southeast San Francisco, SoMa, Union Square, and Chinatown). This policy scenario was specified for the Central Corridor area because the opportunity to regulate parking more aggressively (relative to previous area plans) may be an option, since this area is in the process of being re-zoned.

Carsharing Expansion: This strategy estimates the impacts of an aggressive expansion of carsharing consistent with analysis done by the Metropolitan Transportation Commission (MTC) as a part of *Plan Bay Area (8)*. Such an expansion would be achieved by policies that increase set-aside for off-street parking for car-sharing (current San Francisco policy is one car-share space for every 50 housing units in new developments *(9)*) or expansion of on-street carshare parking spaces as is currently in its nascency *(10)*. Additionally, MTC proposes subsidizing new start-up carshare offices throughout the region. This assumes that 15% of the "eligible population" (defined as adults 20-64) will be become carsharing members by 2040.

1% - 3% VMT Reduction

Dynamic Ridesharing: Dynamic ridesharing explores the potential of heavily investing in outreach and technology to match current single occupant vehicle (SOV) trip-makers to share rides with those having similar trip origins and destinations. In the Planned Future, 59,000 PM peak VMT (60%) are from SOVs. The analysis assumes the market for dynamic ridesharing to be 5% of those who currently drive alone, based on survey results of City and County of San Francisco employees *(11)* and the market research potential of dynamic ridesharing from UC Berkeley *(12)* and MIT (*13).*

Shuttles: Employer-provided shuttles have emerged as a major new sector within San Francisco's transportation system recently, in particular for workers in certain employment sectors such as technology. According to a survey conducted for San Francisco's Transportation Demand Management (TDM) Partnership Project, regional shuttles represent at least 6,600 daily boardings, while intra-city shuttles account for at least 28,700 boardings *(14).* The analysis assumes the market is projected to grow by approximately 40% for regional providers and 39% for intra-

city providers based on forecast increase in employment in these categories. Using TDM Partnership Project survey results as to what mode would serve the trip if the shuttle was not an option, a Planned Future PM peak VMT reduction was calculated based on the share of shuttles that serve SoMa (27%). This strategy is intended to represent partnering with employers to enable the shuttle system to grow as it has been trending without interfering with public transportation, such as through the city's recent efforts to regulate use of bus stops for shuttles *(15).*

0.5% - 1% VMT Reduction

Vanpools*:* The Vanpool strategy applies the MTC *Plan Bay Area (16)* methodology of a strategy that would provide a $400/month/van subsidy to encourage ridesharing growth in the region. In SoMa, this translates to 1,800 new vanpool riders and 700 fewer vehicles in SoMa.

< 0.5% VMT Reduction

Bicycle and Pedestrian Program: This strategy represents major investments to the city's bike and pedestrian networks including building more than 100 miles of upgraded protected bike lanes or cycletracks, and improving pedestrian conditions through safer, redesigned streets and shorter crossing distances. Savings from the Bicycle and Pedestrian program were calculated using SF-CHAMP, which has recently been upgraded to better represent pedestrian *(17)* and cycling *(18)* trip-making behavior. The savings were calculated by comparing the Planned Future to a model scenario that represents upgraded cycletrack-level bike lanes city-wide, as well as representing improved pedestrian conditions through increasing the pedestrian environment factor and reducing facility type to represent slower streets. The resulting change in evening peak VMT in the core as a result of this strategy is forecast to be modest, which was initially surprising to some of the team members. Additional discussion to interpret this result included determining that many new bicycle riders and pedestrians in the modeling exercise were former transit riders, or those drivers who shifted to non-motorized modes, then freed up space for additional drivers, increasing the overall number of trips and biking and walking trips, rather than reducing SoMa VMT. Another point of information that was used to consider the potential effectiveness of this strategy was the short-trips analysis described in Part 1 of this section that found that in whole, removing all auto trips under a half-mile in SoMa/Mission Bay represents 7% of this desired reduction while trips under two miles (including under half-mile) represent 34%.

Safe Routes to School: This strategy models the effect of continuing and expanding the city's Safe Routes to School (SR2S) program. The San Francisco United School District (SFUSD) launched SR2S to increase the attractiveness and safety of walking or cycling to school beginning in the 2009-2010 school year with three schools and currently has 15 schools participating. Based on empirical evidence from the program and experience from SR2S programs in Marin and Alameda counties, an average family vehicle trip reduction of 14% is assumed to result from the program. Applying this to the 15 schools currently enrolled in the program results in 900 fewer daily vehicle trips in San Francisco. When extrapolated to all SFUSD schools plus private schools, 10,000 fewer daily vehicle trips are projected. The 2012-2013 program currently includes one school in SoMa. Therefore, the SoMa share of the current program translates to 100 fewer 2040 PM peak VMT. Accounting for expansion of the program plus private schools results in an additional 160 VMT decrease, or a total of less than 0.5% VMT decrease.

Bikeshare: This strategy represents the benefits from both a pilot program (500 bikes) that launched in San Francisco in August 2013 as well as a Phase 2 (2,750 bikes) that would launch at a later date (after this analysis was completed, the pilot program has sense been reduced to 350 bikes in San Francisco). The pilot project would have placed 360 bikes in SoMa while Phase 2 would place 538 bikes in SoMa. Using a methodology based on trips generated per bike observed in four cities *(19)* and modal diversions of those trips observed in six cities *(20),* ~40 VMT in the 2040 PM peak are expected to be saved as a result of the pilot and ~60 VMT are expected to be saved from Phase 2. This translates to <0.5% VMT reduction from bikeshare alone. However, one would expect bikeshare to be an integral part of an overall coordinated TDM strategy in SoMa and its value may extend far beyond its independent VMT reduction contribution.

Transit: Several transit-related strategies considered showed no notable change in VMT on SoMa streets. Two scenarios were analyzed using the SF-CHAMP model: 1) a second underground rail tube under the San Francisco Bay for the regional heavy-rail system BART that would run from the East Bay, through SoMa under Mission Street and continue under the Geary corridor to the Richmond; 2) a "capacity unconstrained" scenario, where there would be enough room on local San Francisco buses to accommodate everyone who desired to ride transit (SF-CHAMP was recently upgraded to represent transit crowding *(21),* and essentially this "knob" was turned off in this scenario).

In both scenarios, change in PM peak period VMT on SoMa streets was flat. This is not to say that improved transit is not imperative to the functioning of the Core, but rather than on its own, will not result in a notable reduction in SoMa VMT. This finding highlights likely latent demand for driving in this part of the city. Road space given up by those who shift to improved transit service will be replaced by new drivers "filling in" newly available capacity.

Potentially Effective Strategies Not Analyzed

"Fix the Grid": This strategy represents an idea to "fix the grid" by reconnecting streets that do not currently connect well. SoMa/Mission Bay is ground zero for several street grids that interface in awkward ways where they meet including between Downtown and SoMa, between Downtown and Market/Octavia, between SoMa and Mission Bay, and between Mission Bay and Potrero Hill/the Mission District. Several opportunities to make these upgrades have been identified. Although analysis was not undertaken, the team expects such a strategy could contribute modest positive benefits towards SoMa congestion reduction by removing bottlenecks in the network.

Auto Trip Cap: Recently, San Francisco planners have discussed the idea of a private vehicle "trip cap" as a potential next-generation TDM strategy. The idea of such a strategy would be to set an allowance for a maximum number of auto trips that allow the network to continue to function, while charging a fee to trip generators who exceed their trip allowance, similar to a cap-and-trade scheme. While this strategy was not analyzed and would require more detailed specification, it may represent a similar magnitude of potential trip shifts as parking supply restrictions or congestion pricing strategies.

Convert Freeway Lanes and Ramps from General Purpose to Transit/Carpool Because SoMa is home to a series of on- and off-ramps to three major highways of I-80, US 101, and I-280, traffic associated with motorists trying to access those ramps is a notable contributor to PM peak congestion on SoMa streets as shown in Figure 4. A strategy that would close or re-purpose some ramps or travel lanes for use only by transit- or carpool-only may both increase the competitiveness of non-SOV modes, and improve the throughput of those facilities that may be degraded by closely spaced interchanges (0.5-0.7 miles apart through SoMa). Several potential options to operationalize this strategy were developed, but the team did not believe the VMT reduction benefits could appropriately be analyzed within the resources and analysis tools available for the current Study (future work is expected to analyze this strategy in a broader planning context).

DISCUSSION OF RESULTS AND POLICY IMPLICATIONS

The team struggled with how to interpret the result that the level of reduction in demand for auto travel would be challenging to achieve, concluding that in areas of above a certain threshold of high land use intensity, *demand* for auto travel at levels higher than available *supply* will always be present and can only be managed through strong demand management strategies that increase price or restrict vehicle access. In order to maintain mobility and economic vitality concurrently, demand management strategies must be paired with improvements in safety, capacity, and performance of other modes of transportation. Given that reality, there are two challenges and policy implications to discuss: 1) what the city can do to ensure effectiveness of other modes in a congested future; 2) how to evolve from typical forecasting/analysis approaches to long-range transportation planning while still having a rational basis for proposing transportation interventions.

Increasing the effectiveness of non-auto modes of transport in a congested future.

In the San Francisco policy context of a city that has made Transit First an official policy, pure auto congestion is not considered a problem in and of itself if it does not interfere with the ability to accommodate mobility for other modes of transportation, as well as if it allows for the city to maintain its economic competitiveness. But, on-the-ground conditions today are such that during peak commute periods auto congestion *does* interfere with other modes. While some of this interference can be addressed by strategies not yet in place such as greater protection for transit and cycling facilities, the team concluded that in a destination like the Core, that is highly attractive due to the concentration of residential, employment, and visitor uses, increasing intensification would require a transition to more active management of transportation conditions such as deploying resources in real-time based on on-the ground conditions and active enforcement of "don't block the box" (i.e. enforcement/ticketing of cars that remain in an intersection on a red light). Such an approach is already utilized effectively in special cases such as during major sports or cultural events. For example, a recent confluence of major events resulted in one million people converging on San Francisco (the so-called "event-maggedon" of America's Cup/Fleet Week, the Castro Street Fair, the Italian Heritage Parade, Giants and 49ers games, the Hardly Strictly Bluegrass Festival and the Double Ten Parade) on the weekend of October 6, 2012 *(22)*.

However, the team also posited maintaining transit speed and reliability would be increasingly challenging to do so at-grade as congestion and overall trip-making grows. While upgrading streets to provide protected transit facilities is important, challenges such as the need to accommodate access to curb space for goods movement loading and disabled persons and the need to allow private vehicles, pedestrians and cyclists to cross transit lanes, all create negative speed and reliability impacts. As a result, transit may only be truly effective as grade-separated after a certain intensity of trip-making. San Francisco already has underground transit including the regional BART heavy rail system and portions of the Muni Metro system that serves some parts of the city. In addition, the newly planned Central Subway under SoMa, Union Square, and Chinatown, and eventually the planned extension of the Caltrain regional commuter system to Downtown as a part of the California High-Speed Rail project will also contribute to addressing this need. Yet, other parts of San Francisco do not currently have fast or reliable access to any below grade opportunity and some below grade facilities are not providing the level of speed or reliability needed to attract or maintain riders. Of course, this problem is particularly challenging to address given the lack of funding for major capital investments relative to past decades. How to respond to these needs are one focus of the SFTP.

Evolving from typical forecasting/analysis approaches to long-range transportation planning

Historical and to some extent state of the practice approaches to travel forecasting and transportation project evaluation have led to problem-solution framing where an input of more people and more jobs indicate an output of demand for auto trip-making that can only be solved by adding roadway capacity. San Francisco has for some time used a more nuanced approach guided by the city's Transit First policy and prioritized improvements to transit, walking, cycling, and reduction in auto lanes. San Francisco's travel demand model, SF-CHAMP, has been created and upgraded to be sensitive to a broader array of multi-modal interventions. But, the finding about the excess of vehicle demand relative to supply indicates a condition that is not physically possible. While there is widespread recognition that the "solutions" of past--increasing vehicle capacity—are wrong, the now well-recognized candidate solutions related to demand management and multi-modal improvements, are not found to do enough to address the problem when applying empirical evidence about their effectiveness from other cities to San Francisco conditions (of course more stringent representation of strategies could be quantifiably demonstrated to be more effective such as a much higher congestion toll or extreme restriction of parking supply, but were not elected to be studied here).

As the team concluded this particular effort, there was a recognition that the analytic work needed to plan to meet transportation needs in San Francisco's core must evolve to utilize different problem-solution framings. Recent ideas about how else to frame long range planning analysis are to focus on quantifying the expected increase in trip-making from new growth, then planning to accommodate those trips based on policy-driven modal split, and planning for the characteristics (performance, safety, capacity) of transit, cycling, and walking networks that are known to be important factors in travel behavior decision-making in favor of those modes. Approaches such as these are sure to be tested in emerging transport planning work in San Francisco.

LIMITATIONS

There are several limitations to the paper's technical analysis (all of which support the second discussion point regarding evolving from typical forecasting/analysis approaches):

- The paper suggests a particular level of auto traffic reduction needed to avoid perpetual gridlock. This level is based on a methodology of inputting auto traffic demand forecast by a travel demand model into microsimulation software. What is implied by the microsimluation finding is that the travel demand model is forecasting more demand than can be accommodated. Ultimately, the 26% VMT reduction should be interpreted to reflect that there would be that much demand for peak hour auto travel even in congested conditions, but in reality some of those trips would change their time of day, route, mode, or not make the trip at all. Given that SF-CHAMP also represents transit crowding, the level of transit demand would likely also not be able to be accommodated with the existing transit supply.
- The strategies specified could have been specified to be a stronger representation: for example, a congestion pricing policy with a higher priced toll would be expected to increase the VMT reduction of that strategy; similarly a higher number of bikes in a bikeshare program could also be more effective. However, the study aimed to represent strategies based on the current or proposed definitions.
- The strategies do not take into account unprecedented cultural shifts. For example, younger generations are not driving as much as past generations, and bicycling has become rapidly more popular. These trends may indicate a greater impact of some strategies than what is quantified here.
- The relative effectiveness of strategies analyzed via the model versus via off-model may not be perfectly comparable and may overestimate the benefit of off-model strategies. Modeled strategies

show the induced demand of new vehicle trips "filling in" freed up capacity, while off-model strategies do not.

CONCLUSIONS

This paper finds that in areas of high land use intensity, demand for auto travel at levels higher than available supply will always be present and can only be managed through strong demand management strategies that increase price or restrict vehicle access. In order to maintain mobility, such strategies must be paired with improvements in safety, capacity, and performance of other modes of transportation. In the near-term, San Francisco can reduce traffic congestion's impacts on other modes of transport through more regular active management of the transport network and continuing to re-purpose auto lanes for walking, cycling, and transit space. In the longer term, the city will continue to strategically consider additional below-grade/subway additions and upgrades to the local and regional transit network. Finally, future long-range transport analysis should explore new analytical frameworks for long-range transport planning that may be more apt to solve tomorrow's transport challenges.

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Appendix D

REVENUE ASSUMPTIONS

1 Overview

1.1 | Overview

The San Francisco Transportation Plan (SFTP) assumes that the funds needed for implementing the projects and programs that it recommends for funding come from a variety of federal, state, regional, local, and private funding sources. Over the 28-year period from 2013-2040 the Transportation Authority estimates that $75 billion (year-of-expenditure dollars) will be available to fund the operations, maintenance, and expansion of San Francisco's multimodal transportation system.

The SFTP's financial assumptions are based on the revenue projections developed by the Metropolitan Transportation Commission (MTC) as part of the Plan Bay Area Regional Transportation Plan/Sustainable Communities Strategy (RTP/SCS). Over the period from 2013 to 2040, MTC expects $289 billion (year-of-expenditure dollars) in transportation funding to flow to the operations, maintenance, and expansion of the broader Bay Area's multimodal transportation system. MTC's revenue estimate includes all types of transportation funding sources including federal, state, regional, local, and private funding. MTC's estimates also include a number of assumptions about new revenue sources that will become available to the region over the 28 years of the RTP/SCS. In Plan Bay Area, MTC has assumed a $1 increase in the bridge toll for the seven state-owned toll bridges in the Bay Area, a 10-cent regional gas tax, and other "anticipated but unspecified" revenues that account for likely future funding from state bonds, new federal programs, and other unforeseen revenues over the coming 28 years. None of these new revenues are assumed by MTC to kick in until Fiscal Year 2018/19 at the earliest.

To develop San Francisco's countywide estimate, Transportation Authority staff calculated a "San Francisco share" of each revenue source included within the Plan Bay Area estimate. Explanations of specific assumptions for each revenue source can be found in the table below.

2 Detailed Revenue Forecast by Source

San Francisco Transportation Plan - Investment Plan Revenue Estimate - FY 2013/14 - FY 2039/40[1]

In Billions of Year of Expenditure $

Revenue Source	Estimated San Francisco Share		Notes on Assumptions
	Committed Revenue	Discretionary Revenue	
FEDERAL			
FTA 5307 Urbanized Area Formula	4.2	-	Estimate based on SF historic share. Base Year: FY 2009/10 with a 3% growth rate
FTA 5339 State of Good Repair (formerly 5309 Fixed Guideway)	2.5	-	Estimate based on SF historic share. Base Year: FY 2009/10 with a 3% growth rate
FTA 5309 Bus	0.1	-	Estimate based on SF historic share. Base Year: FY 2009/10 with a 3% growth rate
FTA 5309 New Starts	1.6	0.5	Assumes $942.2 million for Central Subway, $650 million for Caltrain Downtown Extension (DTX), and $500 million in additional New Starts funds
FTA 5309 Small Starts	0.1	0.1	Assumes $75 million for Van Ness BRT and $133 million for additional Small Starts projects
FTA 5310 Elderly & Disabled	0.005	-	Estimate based on SF historic share. Base Year: FY 2009/10 with a 3% growth rate

FTA 5316 Job Access Reverse Commute (now part of the new 5307 formula but counted separately here for RTP/SCS consistency)	0.02	-	Estimate based on SF historic share. Base Year: FY 2009/10 with a 3% growth rate
FTA 5317 New Freedom (now part of FTA 5310 Elderly and Disabled)	0.005	-	Estimate based on SF historic share. Base Year: FY 2009/10 with a 3% growth rate
Surface Transportation Program (STP)	-	-	
STP - OneBayArea Grant (OBAG)	0.2	0.006	Based on MTC's OBAG forecast for SF
STP Transit Rehab	0.3	-	Estimate based on SF historic share
STP- Res. 3814 Transit Payback - leftovers 25 years	0.05	-	Estimate based on SF historic share
Congestion Mitigation Air Quality Program (CMAQ)	-	-	
CMAQ - OBAG CMA block grant funds	0.2	-	Based on MTC's OBAG forecast for SF and baseline project's funding plans ($41M for Central Subway)
CMAQ Transit Rehab	0.2	-	Estimate based on SF historic share
CMAQ Res. 3814 Transit Payback - leftovers 25 years	0.05	-	Estimate based on SF historic share
FHWA Ferry Boat Formula	0.1	-	Estimate based on SF historic share. Base Year: FY 2009/10 with a 3% growth rate

Bridge/Safety Program	0.2	-	Estimate based on SF historic share. Base Year: FY 2009/10 with a 3% growth rate
High Speed Rail	-	-	None assumed
Other Federal (ARRA, Public Lands Highway, UPP, TIGER, HPP, FRA funds)	0.7		Based on funding plans for baseline projects
Federal Total	**10.5**	**0.6**	
STATE			
State Highway Operation and Protection Program (SHOPP)	0.8	-	Assumed 2010 STIP Fund Estimate and gas tax subvention, SF historic share of 5.59% of regional revenue
State Highway Account	1.1	-	30 years of availability payments for Presidio Parkway
Regional Transportation Improvement Program	0.2	0.394	Assumed 2010 STIP Fund Estimate and gas tax subvention, SF historic share. Based on Authority Board programming commitments through R11-47. Also includes RIP funds from Marin ($4 million) and Sonoma ($$1 million) counties for Presidio Parkway
ITIP	-	-	None assumed
STIP-TE (now Transportation Alternatives Program)	0.1	-	Assumed 2010 STIP Fund Estimate and gas tax subvention, SF historic share
State Transit Assistance Population-Based	0.9	-	MTC assumed diesel sales and excise tax revenue, based on FY 2010/11 distributions for SF, 2010 SF population estimate

STA Revenue-Based	2.5	-	MTC assumed diesel sales and excise tax revenue, based on FY 2010/11 distributions for SF operators (SFMTA, BART, Caltrain, GGBHTD)
Gas Tax Subvention for Local Streets and Roads	0.458	-	Based on SF share of 12% of regional revenues
AB 105 Revenue for Local Streets and Roads (Prop 42 Replacement)	0.968	-	Based on SF share of 11% of regional revenues
Prop 1B	0.3	-	For Central Subway
Traffic Congestion Relief Program (TCRP)	0.029	-	For Central Subway
High Speed Rail	0.6	-	For Caltrain Downtown Extension
Other State (Prop 1A HSR Connectivity, SLPP)	0.3	-	None assumed
State Total	**8.3**	**0.4**	
REGIONAL			
AB 1107 ½ cent sales tax in three BART counties.	1.5	-	Assumes a SF population share and base year of FY 2009/10, with TDA growth rates
AB 1107 (MTC Share)	1.2	-	50% of MTC share goes to Muni per formula
BATA Base Toll Revenues	0.1	-	Amounts assumed per funding plans for Presidio Parkway, Caltrain Electrification, Transbay Transit Center
Seismic Retrofit	-	-	None assumed

Regional Measure 2 (tolls)	0.1	-	Transbay Transit Center and Caltrain Downtown Extension
Seismic Surcharge	0.005	-	Assumption based on bridge road deck maintenance
Seismic Surcharge + Carpool	0.005	-	Assumption based on bridge road deck maintenance
AB 664 (tolls)	-	-	None assumed
2% Toll Revenues	0.005	-	Assumes continued split of 1/3 for ferry projects and 2/3 for congestion reduction on any BATA bridge, estimate is conservative SF share
5% State General Fund	0.005	-	MTC policy directs funds to WETA and the Bay Trail, estimate is conservative SF share
Rail Extension East Bay	-	-	None assumed
Rail Extension West Bay	0.1	-	Estimate of SF share assumes that 80%+ of West Bay funds will be used by SFMTA, Caltrain, or BART for projects that benefit SF
AB 1171 (tolls)	0.2	-	Assumption based on TJPA funding plans
New Bridge Tolls[2]	-	0.9	Estimate based on RM 2
Regional Gas Tax - $0.10 per gallon[2]	-	0.6	Per legislation, estimate is SF *population* share of $560 million
Transportation Fund for Clean Air (TFCA)/AB 434 (Regional Funds)	0.0061	-	Projected SF share of regional TFCA based on past cycles

Service Authority for Freeway and Expressways (SAFE)	-	-	None assumed
Regional Express Lanes (HOT) Revenues	-	-	None assumed
Other Regional (Carl Moyer Program)	0.02	-	For Caltrain Electrification
Regional Total	**3.3**	**1.5**	
LOCAL			
County Sales Tax Measures Including Prop K in SF	2.8	-	Based on SFCTA forecast with a 3.6% annual growth rate
Existing County Sales Tax Reauthorizations (Period from FY 2034/35 to FY 2039/40)[2]	0.35	0.86	Based on SFCTA forecast with a 3.6% annual growth rate
Local Streets and Roads - Gas tax subventions, other local funds	3.075	-	Estimate based on DPW survey data provided to MTC
Transit Fare Revenues	12.8	-	Based on transit fare revenues from SFMTA and the SF population shares of BART, Caltrain, and GGBHTD
Transportation Development Act (TDA)	-	-	SFMTA, BART, GGT, Caltrain
TDA Article 3 - SF	0.047	-	Based on MTC revenue projections and SFMTA historic share
TDA Article 4 - SF	1.272	-	Based on MTC revenue projections and SF historic shares of SFMTA, BART, GGT, Caltrain
Non-Fare/Other Revenues	9.186	-	Based on SFMTA data provided to MTC
San Francisco General Fund (SFMTA)	7.7	-	SFMTA forecast

San Francisco Parking Revenue (SFMTA)	6.3	-	SFMTA forecast
Golden Gate Bridge Toll Revenue	1.0		SF share based on MTC traffic growth models
BART General Obligation Seismic Bond	0.0	-	Assumes SF population share
Property Taxes	0.5	-	Assumes SF population share of BART property tax.
TFCA/AB 434 (Local Funds)	0.02	-	Estimate based on SF historic TFCA revenues
AC Transit Parcel Tax	-	-	None assumed
Existing County-wide Vehicle Registration Fee ($10) - Prop AA	0.128	-	SFCTA forecast for Prop AA
VTA Express Lane Revenue	-	-	None assumed
SF Congestion Pricing[3]	-	-	None assumed
Land Sales and Other Developer Revenues	1.6		Based on assumptions from TJPA and estimates for other pending development projects (Treasure Island, Hunter's Point Shipyard, Candlestick Point)
Other Local (SMCTA and VTA revenues, includes TIFIA loans repaid with local tax increment, TBD funds for Transbay Transit Center Phase 1)	1.2	-	Development fees and other local revenues
Local Total	**48.0**	**0.9**	

ANTICIPATED/UNSPECIFIED			
Anticipated/Unspecified[4]	**0.00**	**1.65**	Assumes a San Francisco share consistent with San Francisco's OBAG share of 11.8%
GRAND TOTAL	**70.1**	**5.00**	

[1]Source: SFCTA, based on MTC's Plan Bay Area revenue forecast. Includes total revenues for SFTP baseline projects, including revenue allocated prior to FY 2013/14.
[2]Shaded sources (Regional Gas Tax, County Sales Tax Reauthorization (extending beyond FY 2033/2034), New Bridge Tolls, and Anticipated/Unspecified) all are assumed in MTC's Plan Bay Area revenue forecast, and all require legislative and/or voter approval to be put into place.
[3]The Congestion Pricing program raises approximately $2.5 billion in net revenue (not reflected above) that is invested in supportive multimodal projects and programs.
[4]Anticipated/Unspecified is an estimate based on analysis of new fund sources that have materialized between past Regional Transportation Plan updates. This has included sources such as state bonds (Props 1A and 1B) state Prop 42, and federal stimulus funds.

Appendix E

SFTP OUTREACH SUMMARY

KEY TOPICS

- Summary of SFTP outreach activities
- Key outreach findings
- How key findings influenced the plan

1 Introduction

1.1 | Overview

To ensure that the 2040 San Francisco Transportation Plan (SFTP) reflects public priorities, the San Francisco County Transportation Authority undertook an extensive outreach process to gather input from residents, merchants, community organizations, business associations, elected bodies and other important constituents. This report summarizes outreach activities associated with the plan. It begins with an overview of the outreach process, a description of key feedback, and a summary of how the plan incorporates that feedback. The remaining sections describe each of the five outreach rounds performed (Figure 1), including the purpose, methods, and findings.

Input was solicited multiple ways, including through:

- Opinion surveys
- Calls for submission of transportation project candidates
- An interactive website
- Tabling at events
- Meetings with neighborhood, business, civic, and advocacy groups (Table 1 provides a list)
- Briefings to government boards and councils (Table 2 provides a list)

Figure 1 SFTP Outreach Schedule

1.2 | Full Participation of Low-Income and Minority Individuals

Ensuring full participation and equal representation of low-income and minority community members was an important goal of the SFTP outreach process and was necessary to meet Title VI requirements for countywide transportation plans. Special efforts were made to encourage participation of these these individuals, including particular focus on neighborhood meetings, newspaper advertisements, and fact sheet distribution in neighborhoods designated as 'Communities of Concern' by the Metropolitan Transportation Commission.[10]

Materials such as fact sheets and flyers, as well an interactive game developed to facilitate outreach, were produced and distributed in at least three languages: English, Spanish, and Chinese; and in certain instances, materials were produced in additional languages, among them Tagalog and Russian, to further reach underrepresented minority communities. Materials were also designed to maximize their usability for members of the community with visual or hearing impairments. Non-English media sources, such as radio and local print media, were also identified and used to advertise opportunities to obtain information or provide input.

In terms of outreach activities, attendance at meetings and events of community-based and neighborhood organizations, as well as special presentations to members of the communities they represent, were carried out with particular attention paid to low-income and minority communities. In certain cases, when it was established that these communities were underrepresented as a proportion of attendees or respondents, further outreach was performed specifically to such communities to ensure full participation.

Table 1 Neighborhood, Community, and Business/Merchant Group Meetings

Alliance for a Better District 6	Outer Mission Merchants and Residents
Bayview Project Area Committee	Planning Association of Richmond
Bernal Heights Neighborhood Center	Rincon Hill/Mission Bay Neighborhood Association
Castro/Eureka Valley Neighborhood Association	SoMa Leadership Council
CC Puede	South of Market Community Action Network
Chinatown Community Development Center/Chinatown TRIP	Sunset Parkside Education Action Committee (SPEAK)
Coalition of San Francisco Neighborhoods	Tenants Association of San Francisco
District 11 Council	Tenderloin Futures Collaborative
Excelsior Conveners	Tenderloin Neighborhood Development Corporation
Hayes Valley Neighborhood Association	TODCO

[10] Communities of concern are those with over-representation of minority, low-income, non-English speaking, zero-vehicle, senior/disabled, single-parent, and renter households. In San Francisco, these include: Downtown, China-town/North Beach/Treasure Island (2) Tenderloin/Civic Center, (3) South of Market, (4) Western Addition/ Inner Richmond, (5) Inner Mission, (6) Bayview/Hunter's Point, and (7) Outer Mission/Crocker-Amazon/Ocean View.

Japantown Task Force	Treasure Island Development Authority
Lower Polk Neighbors	Visitacion Valley Planning Alliance
North of Market Business Association	Wigg Party

Table 2 Board and Commission Meetings

Authority Board	Mayor's Disability Council
San Francisco CBDs/BIDs Consortium	Transportation Advocates Briefing
Planning Commission	Authority Citizens Advisory Committee
Supervisorial Aides Briefing	Environment Commission Policy Committee
Mayor's Disability Council (Physical Access Committee)	Small Business Commission
SPUR Transportation Policy Board	Pedestrian Safety Advisory Committee
Muni Accessibility Advisory Committee	SF Chamber of Commerce

1.3 | Key Feedback Messages and Plan Response

The outreach process revealed several key public concerns and priorities for the future of transportation in San Francisco. These concerns are listed below along with a summary of how the plan responds to them.

ISSUE: PRIORITIZATION OF TRANSIT SERVICE AND RELIABILITY IMPROVEMENTS. A large number of community members said that transit service and reliability had degraded to unacceptable levels in recent years. In light of this, there was high demand for fixing current problems. Almost 70 percent of Round 1 survey respondents listed not enough/unreliable transit service as San Francisco's top transportation challenge and a similar percentage indicated a desire for more frequent, reliable transit service. In Round 4, 68 percent of respondents selected moderate or aggressive funding increases for transit operations and maintenance.

> **PLAN RESPONSE – TRANSIT SERVICE:** The financially constrained plan very minimally increases historical funding levels for transit service. Available revenues were insufficient to fund across-the-board increases in transit service frequency, as this would require significantly reducing historic funding levels for other projects and programs. However, the plan does include service increases on several lines funded through a congestion pricing program in downtown[11]. The vision scenario shows how new revenues could be used to augment transit service so that all of today's scheduled service[12] is provided.

> **PLAN RESPONSE – TRANSIT RELIABILITY:** Poor transit system reliability has many causes. One cause is unexpected vehicle breakdowns due to aging or badly maintained vehicles. The SFTP addresses this by fully funding transit vehicle replacement for all transit operators and mid-life overhauls for MUNI vehicles. Another cause is transit vehicles operating in congested conditions. The SFTP addresses this by advancing congestion pricing, which would increase transit speeds by as much as 25 percent in the downtown core. The Plan also includes several capital projects that would provide dedicated roadway space for transit, such as the Geary Bus Rapid Transit project and the Bayshore / Potrero Bus Rapid Transit. Finally, the SFTP funds several projects intended specifically to improve transit reliability, including the Transit Effectiveness Project, and several others.

ISSUE: SUPPORT FOR ENHANCEMENTS TO BICYCLING AND WALKING SAFETY AND TRAFFIC CALMING. In the round 1 survey, bicycle and traffic calming or streetscape improvements ranked second- and third-most-desired improvements, after transit. In a Round 4 outreach activity, bicycling and walking/traffic calming were the second- and third-highest priorities for moderate or aggressive funding increases (after transit). Additionally, projects submitted in the Round 2 Call for Projects demonstrated a desire for pedestrian safety improvements, even if it requires slowing traffic or reducing space available for cars. Support likewise existed for removal of travel lanes in favor of transit or bicycles.

> **PLAN RESPONSE:** The financially constrained plan increases investment in walking and traffic calming by 50 percent over historic levels and triples historic funding in bicycling

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[11] See the Mobility, Access, and Pricing Study for detail on this proposal. http://www.sfcta.org/transportation-planning-and-studies/congestion-management/mobility-access-and-pricing-study-home

[12] Budget constraints currently prevent the SFMTA from operating all scheduled service.

infrastructure. This provides 40 and 20 percent of the funding required to completed the SFTMA's Pedestrian and Bicycle strategies, respectively[13]. The vision scenario demonstrates how these programs could be fully funded with new revenues.

ISSUE: SUPPORT FOR PROJECTS CURRENTLY IN THE PIPELINE AND A DESIRE TO SEE THEM DELIVERED FASTER. Many of the projects currently being pursued by the City and its agencies received support from the public, such as Better Market Street, the Transit Effectiveness Project, Van Ness and Geary Bus Rapid Transit lines, the Downtown Congestion Pricing Pilot, and the Oakdale Caltrain station, but there was demand for expedited delivery of these projects and frustration with slow implementation.

PLAN RESPONSE: The financially constrained plan included full funding for Better Market Street, the Transit Effectiveness Project, Geary Bus Rapid Transit, the Downtown Congestion Pricing Pilot, and the Oakdale Caltrain Station. The Van Ness BRT is a "pre-committed" project which is fully funded in the SFTP baseline (see Appendix A for more detail on baseline versus plan projects).

ISSUE: OPENNESS TO DISCUSSING AN INCREASE IN REVENUE TO FUND TRANSPORTATION. Community members recognized that current transportation challenges are at least partially tied to insufficient funding and were interested in discussing the possibility of increasing revenue levels. For example, over 70 percent of respondents in Round 4 selected an increase in revenue for their preferred transportation funding plan. A number of community members likewise raised concerns about the continual disinvestment seen in recent history.

PLAN RESPONSE: The SFTP includes a secondary plan (vision scenario) that quantifies the amount of new revenue that could be obtained from additional sources, and describes how revenues would be applied to address funding shortfalls.

ISSUE: PERCEPTION OF INSTITUTIONAL REFORM AS A MEANS TO SOLVE OR AMELIORATE MANY CURRENT OPERATIONAL, BUDGET, AND PROJECT DELIVERY ISSUES. Some participants expressed skepticism or distrust with regard to the use of funds and justifications for project delays. Audits and greater transparency (e.g. clarity regarding how revenues are used and whether promised improvements are delivered) were cited as a way to see improvement in these areas.

PLAN RESPONSE: The SFTP includes policy recommendations for needed institutional changes such as improved project delivery and more cost-effective transit service provision. See the SFTP White Papers on Large and Small Project Delivery.

ISSUE: REQUEST FOR ADDITIONAL OPPORTUNITIES FOR INPUT ON MAJOR EFFICIENCY AND EXPANSION PROJECTS, AS THEY ARE DEVELOPED. These include the TEP, congestion pricing, and the Pedestrian and Bicycle Strategies.

PLAN RESPONSE: The SFTP identifies this need and can help ensure that outreach activities are eligible for funding.

ISSUE: Concern with the geographic and socioeconomic equity of transportation system conditions, performance, and investment. Throughout outreach we heard concerns that certain

[13] See the Needs Analysis White Paper for more information on the Pedestrian and Bicycle Strategy.

aspects of transportation system performance, and access to the transportation system, disproportionately benefit certain neighborhoods or groups and not others. .

> **PLAN RESPONSE:** We conducted an equity analysis to identify system performance or access issues that are disproportionately concentrated within certain neighborhoods or that negatively impact certain groups. The findings shaped the development of the investment scenarios. We also included an equity line item in the investment scenarios.

Beyond these specific issues, SFTP outreach contributed to the plan development in numerous small ways. For example, outreach was used to identify the transportation capital projects most desired by the public (through calls for projects), and to inform the SFTP project prioritization methodology.

2 Outreach Rounds

This section discusses the methods used and results obtained from each of the five rounds of SFTP outreach and describes how the results informed plan development.

2.1 | Round 1: Existing and Future Transportation Conditions

2.1.1| PURPOSE

The initial round of outreach, performed in winter of 2010, aimed to identify the public's top transportation concerns now and for the future, as well as to raise awareness of the SFTP Update process and connect with key neighborhood and community groups. Activities included an open house, two webinars, engagement through social media, presentations to community groups, and a survey (Table 3).

Table 3 Round 1, Existing and Future Transportation Conditions (Fall/Winter 2010)

ACTIVITY	DESCRIPTION
Open House	Initial meeting for public to learn about SFTP and offer their opinions on the process
Survey (via Survey Monkey)	Online/paper survey regarding existing and future transportation needs, challenges, and desires. Gathered 400 responses.
Direct outreach to neighborhood groups ('Roadshow')	Presentation of information and solicitation of input regarding SFTP update process

2.1.2 | SURVEY RESULTS

Survey results are summarized in Figures 2 and 3 below. Figure 2 presents responses to the question, "What will be San Francisco's major transportation challenges in the future?" while Figure 3 displays answers to the question, "What transportation changes would you like to see in San Francisco by 2035?" In each case, respondents were given six choices or the opportunity to specify a unique answer. Qualitative feedback expressed by community members during presentations, webinars, open houses, and other outreach activities was also gathered and is included in the summary below.

Transit performance was the top priority, with over 65 percent of respondents saying that there was not enough reliable transit service (Figure 2) and over 70 percent saying more transit service was needed (Figure 3). In conjunction with survey responses concerning transit service being unreliable or slow, qualitative input from community members demonstrated that many people feel that Muni service has gotten worse: slower, less frequent, less reliable, more crowded, less safe, and more expensive.

Community members noted a significant increase in cycling and stated that although cycling conditions had been improving, there was still room for more improvement and a desire for more dedicated bike facilities such as the green buffered bike lane on Market Street. In the survey, over 40 percent of respondents identified bike infrastructure as a priority (Figure 3). With an increase in cycling, there was concern expressed about the need to educate cyclists to respect other road users and obey traffic laws.

The survey and outreach also identified pedestrian safety as a critical issue. Twenty-two percent of survey respondents indicated difficult or unpleasant conditions for pedestrians as a potential future challenge for San Francisco (Figure 2). Safety concerns included vehicles speeding or not yielding to pedestrians in the crosswalk and a lack of convenient and frequent pedestrian crossing opportunities. The recent increase in public spaces for pedestrians, such as parklets, was noted as positive change in the city.

With regards to automobiles, traffic and congestion was the second-most cited future transportation challenge at 42 percent of respondents (Figure 2). Most respondents recommended addressing traffic issues with additional traffic calming, while few respondents selected signal timing for faster car travel as a desired change.

Respondents also asserted that a lack of adequate road maintenance would continue to be an issue and require continued attention, with 33 percent citing poor pavement conditions as a future problem (Figure 2) and 30 percent wishing for better surfaces (Figure 3). This lack of maintenance was said to affect all users: potholes make traveling unpleasant or unsafe for drivers, transit riders, cyclists, and pedestrians alike.

Figure 2 What Will Be San Francisco's Major Transportation Challenges in the Future?

	Response Percent	Response Count
Too much car traffic and congestion	42.8%	143
Not enough or unreliable transit service	**67.1%**	**224**
Slow transit service	42.5%	142
Greenhouse gas emissions and air pollution	19.5%	65
Difficult or unpleasant conditions for pedestrians	21.9%	73
Difficult or unpleasant conditions for bicyclists	25.1%	84
Potholes / poor pavement conditions	32.6%	109
Expensive or unavailable parking	27.2%	91
Other (please specify): Show Responses	6.6%	22

Figure 3 What Transportation Changes Would You Like to See in San Francisco by 2035?

	Response Percent	Response Count
More frequent and reliable transit service	**72.9%**	**242**
Faster transit service	40.4%	134
Better traffic-signal timing for faster car travel	13.0%	43
Slower, traffic-calmed streets and attractive streetscapes	42.8%	142
More bike lanes and bike paths	43.7%	145
Greater parking availability	18.7%	62
Fewer potholes and smoother pavement	30.1%	100
Real-time information on transit, traffic and parking	19.9%	66
Other (please specify): Show Responses	11.1%	37

2.2 | Round 2: Call for transportation projects (part I)

2.2.1 | PURPOSE

The second round of outreach consisted of a call for transportation project proposals, which was performed in conjunction with activities to update the Regional Transportation Plan (RTP) and Sustainable Communities Strategy (SCS). The call was issued through the Authority website, as well as

through presentations and handouts to neighborhood groups, the Plans and Programs Committee, and the Citizens Advisory Committee (CAC). Neighborhood groups representing low-income areas or areas with a significant minority population were particularly sought out to provide feedback. In the end, more than 200 project ideas were received.

Table 4 Round 2, Call for Projects, Part I (Fall/Winter 2010; accepted input 2/22/2011-3/24/2011)

ACTIVITY	DESCRIPTION
Release of call for projects	Solicitation of project ideas submitted through webpage form, email, phone, neighborhood meetings, and public comment periods during call for projects items (over 200 ideas received)
Presentations at regular meetings of community and business groups citywide	Provision of call for projects process explanation with a focus on areas of interest expressed by meeting organizers

2.2.1 | SUMMARY OF RESULTS

Many of the submitted projects are already being pursued or considered by the Authority and the MTA, such as Better Market Street, the Transit Effectiveness Project, Van Ness and Geary Bus Rapid Transit lines, ENTRIPS circulation improvements, the Downtown Congestion Pricing Pilot, and the Oakdale Caltrain station. These improvements are in line with goals expressed elsewhere in the outreach, particularly faster and more reliable transit.

Submitted projects also included many pedestrian, cycling, and traffic calming improvements such as wider sidewalks, pedestrian countdown signals, bike racks and bikeways, bus shelters, and transit priority treatments. Many also demonstrated high demand for expansion of transit in designated right-of-way and, related to this, demand for roadway capacity reduction—for example, closing on- and off-ramps or replacing freeways with surface boulevards. There were no requests for roadway expansion projects.

Submitted projects were prioritized for inclusion in the plan through a project prioritization process, described in detail in Appendix A: SFTP Plan Development Process.

2.3 | Round 3: Transportation priorities/call for transportation projects (part II)

2.3.1 | PURPOSE

As summarized in Table 5, the third round of outreach included three separate activities: (1) a second call for projects, conducted to provide additional opportunities for submission of project ideas, particularly from low-income and minority communities; (2) a special survey to obtain information on school transportation needs; and (3) webinars to share information on the SFCTA's analysis of what it would take to reach the city's goals for the transportation system.

Table 5 Round 3, Call for Projects, Part II (Summer/Fall 2011)

ACTIVITY	DESCRIPTION

Re-release of call for projects	Additional solicitation of project ideas submitted through webpage form, email, phone, neighborhood meetings, and public comment periods during call for projects items (26 additional received)
School transportation needs assessment	Survey to gather information about transportation needs of students and parents of school-age children Student focus groups Parent focus groups
Two lunchtime webinars	Online public meetings to present four SFTP aspirational scenarios
Presentations at regular meetings of community and business groups citywide	Provision of call for projects process explanation with a focus on areas of interest expressed by meeting organizers

2.3.2 | SUMMARY OF RESULTS

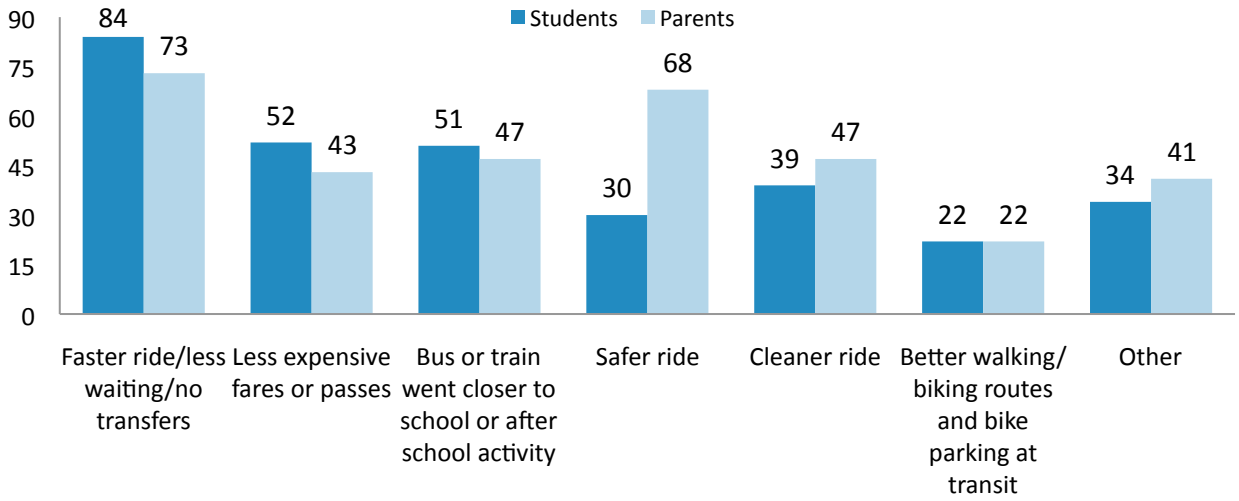
SECOND CALL FOR PROJECTS

The second call for projects generated some additional project ideas, though many included those already suggested in the first round. In total, more than 300 project ideas were generated through both calls and associated surveys and public outreach.

SCHOOL TRANSPORTATION NEEDS ASSESSMENT

The school transportation needs assessment involved parent and student focus groups and distribution of an online survey. Over 1300 fully or partially-completed surveys were collected. Survey results demonstrated that school children and their parents are very concerned with the quality and particularly the speed of transit service; both parents and students selected faster transit service as their most desired improvement (Figure 4). Students and parents were also concerned with the cost of service and proximity to destinations, with over 40 percent of each group saying these factors would improve the journey 'a lot'. Parents were more preoccupied with safety than their children: 68 percent chose safety as a desired improvement compared to 30 percent of children. Focus groups also reflected concern regarding transit service quality, especially bus frequency, crowding, reliability, and long travel times.

Figure 4 Responses to School Survey Question: How Much Would these Improve Your Transit Ride to School?



ASPIRATIONAL SCENARIOS

The SFTP Aspirational Scenario exercise involved extensive analysis to determine what it would take for San Francisco to achieve its transportation goals in the areas of economic competiveness, livability, and healthy environment. The aspirational scenarios are described in more detail in Appendix B: Needs Analysis White Paper. During outreach, SFCTA staff presented aspirational scenario results to several community groups.

In response, community members asserted that the goals in the scenarios are not mutually exclusive but interdependent: the SFCTA should focus on solutions that achieve multiple goals. Prioritizing investments in improvements that support San Francisco's Transit First policy was identified as the best way to accomplish all goals in a holistic and efficient manner. Others felt that the scenarios did not sufficiently address the needs of private automobile users, and asserted that Muni must be significantly improved before automobile use can be reduced.

2.4 | Round 4: Investment strategy

2.4.1 | PURPOSE

As summarized in Table 6, the fourth round of outreach aimed to determine how the public would prioritize transportation revenue across competing priorities, and to gauge interest in raising additional revenue to address unmet transportation needs. This was achieved through a web-based tool called the 'Budget Czar'. The tool allowed individuals to select overall

funding levels for transportation (e.g. current revenues or augmented revenues) and to create a transportation spending plan within their selected budget constraint. Results were presented at multiple community meetings and events.

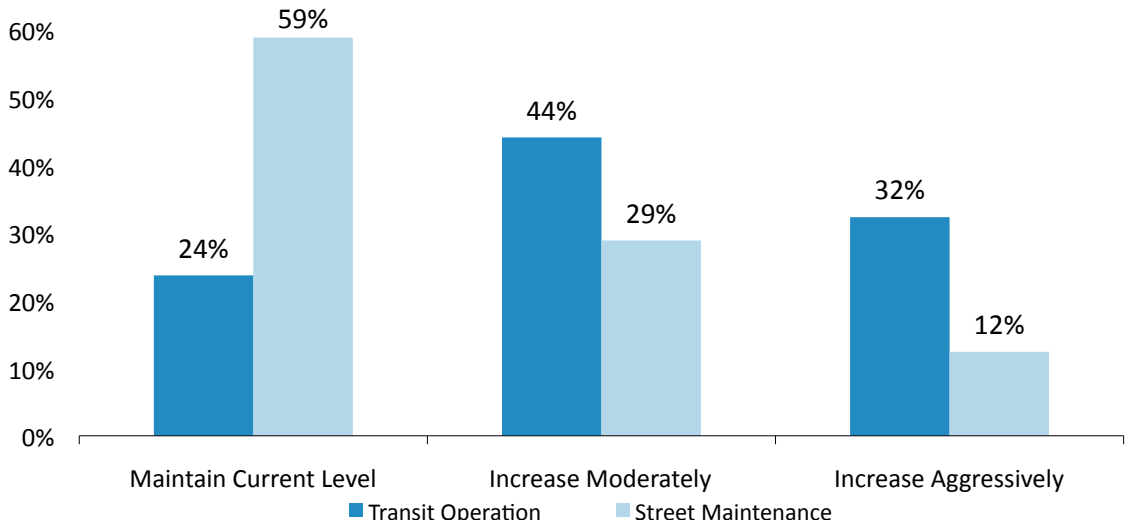
Table 6 Round 4, Investment Strategy

ACTIVITY	DESCRIPTION
'Budget Czar': Interactive website	Game-like website for individuals to develop a transportation spending plan
Tabling at events citywide	Presence at events to inform public of SFTP update and Budget Czar, and to receive in-person feedback
Presentations at regular meetings of community and business groups citywide	Presence at meetings to distribute flyers announcing Budget Czar and to gather qualitative feedback
Presentations at board and commission meetings	Presentations describing Budget Czar and giving opportunities for qualitative feedback

2.4.2 | SUMMARY OF RESULTS

The Budget Czar tool prompted respondents to indicate whether to reduce, maintain, increase, or aggressively increase spending on certain transportation improvements. Feedback echoed results from previous outreach rounds: respondents showed strong interest in increased funding for transit operations—75 percent wanted to moderately or aggressively increase funding—relative to street maintenance, where only 41 percent included moderate or aggressive increases (Figure 5).

Figure 5 Operations and Maintenance Investment



The tool also asked about respondents' preferences for level of investment in six county transportation funding programs (shown in Figure 6). Responses again demonstrated support for Muni enhancements,

walking and traffic calming, and bicycling, with respondents selecting moderate or aggressive investments in these programs in over 60 percent of cases. Support for aggressive funding increases was greatest for bicycling programs, with 43 percent of respondents calling for such increases.

With regards to the amount of revenue included in respondents' spending plans, the majority (72 percent) opted for the medium option (increase revenue by $4 billion) or the high-revenue option (increase revenue by $6 billion) (Figure 7). Many also noted desire for more discussion of the tradeoffs between different types of revenue measures and interest in more opportunities to engage in discussion of which types of future revenue are most appropriate.

Figure 6 Number of Respondents by Investment Level and Program

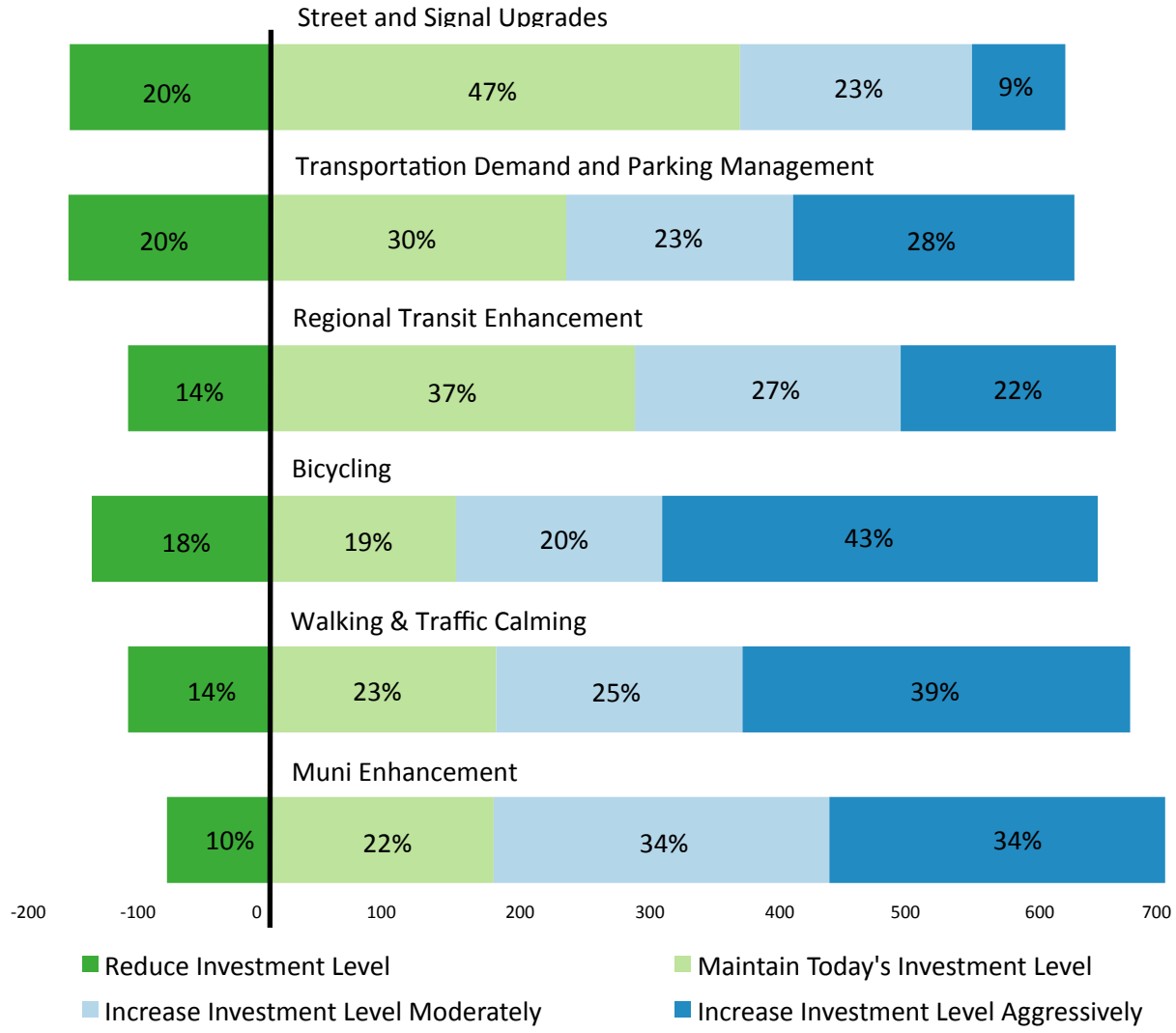
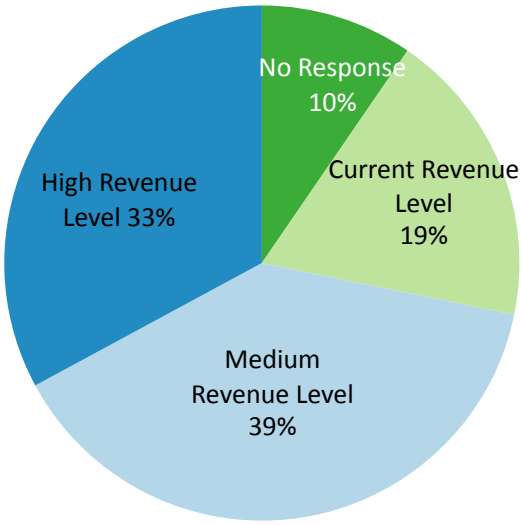


Figure 7: Revenue Level by Percentage of Respondents



Other respondents noted a desire for institutional reforms that improve transit operations, provide cost savings, and speed the delivery of projects. Several voiced frustration with repeated delays caused by inadequate maintenance, a perceived lack of transparency and oversight, and concern with planned projects not completed in a timely fashion.

2.5 | Round 5: Draft Recommendations and Early Action Program

2.5.1 | PURPOSE

The fifth round of outreach sought to share the SFTP Investment recommendations, and to involve the public in shaping the content and priorities of the SFTP Early Action Program. It had three objectives. The first was to share how input from prior outreach was incorporated into the draft SFTP Investment Scenario and policy recommendations, and to seek feedback. The second objective was to seek public input on a range of potential new revenues to support the unmet needs identified in the SFTP. The third objective was to raise awareness of the Prop K program and Authority-funded projects in neighborhoods across the city and seek public input in shaping the next generation of projects and programs to be included in the SFTP Early Action Program. To ensure these educational efforts reached Communities of Concern, ten Community-Based Organizations (CBOs) were contracted to advise and help implement outreach. Their activities included targeting notifications about upcoming open houses to specific communities, creating outreach notices in accessible formats and multiple languages, and conducting outreach meetings for their communities.

ACTIVITY	DESCRIPTION
Community-Based Organizations	We partnered with over 10 community-based organizations to reach out to communities of concern and hard to reach groups (e.g., low English

	proficiency communities). Activities included workshops, focus groups, press conferences, and distribution of materials in Chinese, Spanish, Russian, and Tagalog; a forum on Sing Tao Radio, surveys administered at SROs, community events and festivals, and food pantries; and more.
Public Open Houses	Three workshops presented the draft SFTP Investment Scenario, Policy Recommendations, and Early Action Program and solicited public feedback.
Transportation Authority website, Citizens Advisory Committee meetings, and the Board's Plans and Programs Committee meetings	Opportunities for public input
Presentations to Commissions	Bicycle Advisory Committee, Pedestrian Safety Advisory Committee, Small Business Commission, Environment Commission Policy Committee

2.5.2 | SUMMARY OF RESULTS

Round 5 of SFTP outreach produced comments from the public during open houses held in the Bayview, downtown, and at San Francisco State University. Feedback came in the form of questions and comments during the meetings that were noted by staff, as well as comment cards filled out by participants. In addition, several Community Based Organizations conducted surveys and focus groups. These included focus groups with Chinatown TRIP, APACC, POWER, Visitacion Valley Planning Alliance, Tenderloin Housing Clinic / Central City SRO Collaborative, and RPoS, surveys at the Potrero Hill Festival and PHNH Food Pantry, and a youth survey conducted by Brothers for Change.

Outreach feedback relevant for the SFTP indicated support for the five broad categories of SFTP investment and policy recommendations. Operations and maintenance of the existing transit network, as well as improved street safety citywide, were cited as top priorities. Feedback emphasized ensuring that sufficient transit service is provided to meet the needs of today's residents and workers – to reduce crowding and improve reliability – and that new growth in housing and jobs is accompanied by investment in new transit capacity. Commenters called for greater investment in the maintenance and good repair of the transit network. Feedback also reinforced that street safety for pedestrians and bicyclists is a top priority in neighborhoods throughout the city. Finally, responses from the public called for the City and all involved agencies to provide further opportunities for input as SFTP priorities are implemented, such as the Transit Effectiveness Project, Congestion Pricing, and the citywide Bicycle and Pedestrian Strategies. We also heard calls for ensuring that future transportation investments of any kind are equitable, both by addressing geographic deficiencies in system performance (e.g., reliability) and by ensuring that the needs of communities of concern are equally addressed.

TRANSIT PRIORITIES

When asked about priorities for transit in San Francisco, commenters named efficiency, safety, reliability, and travel time. Others asked for a focus on maintenance, pointing out that this affects

reliability and safety, and others wanted to prioritize stability in transit operations. On-time, frequent service (including more weekend and evening service, particularly in low-income communities), bus crowding and lack of seats, bus cleanliness and comfort, and crime on transit were all mentioned as serious issues. The Free Muni for Youth program is seen as crucial by many low income transit riders. Other issues included: the need for more capacity, buses with extra doors, bus stop lighting, and restoring past service cuts, especially in the southwest parts of the city.

Different routes are priorities for different neighborhoods, but a significant route often mentioned as needing improvement was the T-Third line (frequency, reliability, and speed being priorities, as well as capacity).

Many people urged that transit investments be focused on safety and operations as well as new buses, before major capital projects. Many recognized that transit needs more revenue, and several suggestions were made about how to raise money: from large businesses or through HOT lanes on the freeways that pass through San Francisco. "Coordinate investment with growth," urged one comment; another expressed concern that revenues be spent transparently and with accountability.

Appendix F

TRANSPORTATION EQUITY ANALYSIS

Throughout outreach conducted for the SFTP, we heard a concern that some transportation access and performance issues are not geographically or socioeconomically equitable. In response, the San Francisco County Transportation Authority completed an equity analysis of the baseline transportation system. The results helped shape the investment scenarios and informed capital project prioritization for the SFTP. First, we prioritized funding that would address the geographic and socioeconomic inequities found in the transportation system. In addition, when identifying major efficiency and expansion projects for funding, we considered whether a project would address inequitable conditions identified in the equity analysis. See SFTP Appendix A for more detail on capital project prioritization. A memorandum documenting the equity analysis results is attached.

San Francisco County Transportation Authority

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Memorandum

DATE: Monday, May 13, 2013

TO: San Francisco Transportation Plan (SFTP) Technical Advisory Committee

FROM: Joshua Karlin-Resnick

THROUGH: Rachel Hiatt – Principal Transportation Planner

SUBJECT: Equity analysis of existing and future transportation system performance

EXECUTIVE SUMMARY

In response to Board and Community Advisory Committee (CAC) request, the San Francisco Transportation Plan (SFTP) team has drafted a geographic and socioeconomic equity[1] analysis of existing and Future Baseline transportation conditions. The analysis considers whether and how certain transportation conditions disproportionately affect certain areas of the city and/or socioeconomically disadvantaged communities. The Future Baseline conditions assume that no additional transportation investments are made beyond those in the SFTP Baseline Policy.

The equity analysis considered three types of transportation measures: safety, network quality, and system performance. The draft analysis finds that socioeconomically disadvantaged communities in San Francisco tend to experience greater transportation safety risks than San Francisco in general. The analysis also found that all transportation system performance measures considered tend to cluster geographically, with the worst conditions concentrated tin certain parts of the city and the best conditions in other parts. However, some system conditions correlate geographically with density levels and topography, and are therefore expected and do not necessarily indicate inequities.

S**afety:** The analysis finds the city's disadvantaged communities, whether they are situated in dense central areas or the more outlying parts of the city, see significantly higher incidences or rates of pedestrian injuries, bike injuries, and crime committed on the street or in the transit system than do other parts of the city.

T**ransportation network quality:** This analysis finds that the quality of the transportation network clusters geographically, with the best network quality in the denser, more central parts of San Francisco and the least network quality in the less dense, outlying, and hilly parts of the city. However, this correlation between network quality, density, and topography is expected, and does not necessarily indicate an inequity. Transportation-quality metrics that conform to this pattern include access to the rapid and regional transit networks and transfer rates.

[1] The SFTP Equity Analysis is not a federal Title VI analysis. Federal Title VI analysis uses methodologies and metrics different from those discussed here. The SFTP Equity Analysis methodology and metrics are designed to specifically address the considerations of the Board, SFTP CAC, and SFTP analysis team.

T**ransportation system performance:** This analysis finds that some system performance issues do cluster geographically in patterns that are unrelated to land use density or topography. The metrics with the biggest such disparities are transit speeds, reliability, and crowding.

In analyzing these metrics, the team looked at existing conditions and, where possible, 2040 Baseline conditions. The Baseline scenario includes a small set of committed transportation investments,[2] and therefore this analysis does not reflect the contribution of potential SFTP investments such as the Transit Effectiveness Project or the SFMTA Pedestrian and Bicycle Strategies on equity issues.

The analysis uses the Metropolitan Transportation Commission's Communities of Concern to identify areas with the highest concentrations of disadvantaged communities. CoCs are those that exceed thresholds on four of eight "degrees of disadvantage," criteria that include the percent of the population that is low-income, a racial/ethnic minority, or disabled, among others. The criteria were chosen and thresholds defined through a year-long process led by MTC. The study uses the Authority's 12-neighborhood system to identify geographic disparities.

For each transportation system metric, conditions throughout the city were divided into quintiles or other using appropriate thresholds. To identify socioeconomic disparities, the analysis looked at whether communities of concern contained a significantly higher percentage of zones in the low- or high-performing quintiles/performance groups than the citywide average. To understand geographic equity, the analysis used a similar approach, with the 12 neighborhoods as the unit of analysis.

This analysis was developed for SFTP purposes, and is not a Title VI analysis. The methodology and metrics used here were developed to inform long-range planning on issues of interest to the Authority Board and in response to stakeholder input. The findings of this analysis will be considered in the development of the SFTP financially constrained and vision scenarios; for instance, the SFTP may recommend increased levels of funding for areas of the city that experience disproportionately worse system performance conditions than average.

[2] See SFTP Baseline Memorandum, 2012.

INTRODUCTION

The San Francisco Transportation Plan (SFTP) team analyzed San Francisco's existing and 2040 Baseline future transportation system through the lenses of both geographic and socio-economic equity.

To understand geographic equity, the SFTP team analyzed whether system performance problems cluster geographically, disproportionately affecting certain parts of San Francisco in ways that are not associated with topography or broad land-use patterns.

To understand socioeconomic equity, the team analyzed whether "communities of concern" disproportionately experience the worst system safety, quality, or performance issues. The Metropolitan Transportation Commission (MTC) has defined communities of concern (CoCs) as those census tracts with populations that have a disproportionate percentage of four of the following eight groups: individuals from a racial or ethnic minority group, residents with incomes lower than 200 percent of the poverty line, residents with limited English proficiency, households with zero-vehicles, residents over 75 years old, people with a disability, single-parent families, and cost-burdened renters.[3] Tracts with concentrations of low-income or minority individuals alone also qualify. The MTC used data from the 2011 American Community Survey to define the geography. See *Figure 1: Communities of Concern*

for a map of CoCs.

The MTC's CoC geography misses some small areas that city departments have previously identified as having large socioeconomically disadvantaged populations. As such, the Authority's draft Priority Development Area (PDA) Growth and Investment Strategy recommends that the SF Planning Department lead an effort to create a locally specific CoC definition. However, given that the MTC geography captures most zones with high concentrations of disadvantaged populations and given the extensive public process the MTC's methodology underwent in 2011 and 2012, the SFTP team believes the MTC geography works well for this analysis, in lieu of a customized local alternative.

Below are the metrics through which the SFTP analyzed geographic and socioeconomic equity:

- Safety
    - Pedestrian safety
    - Bike safety
    - Street/Transit Crime
    - Transportation-Related Air-Quality Impacts
- Transportation Network Quality[4]
    - Access to Muni Rapid Network
    - Access to the Regional Transit Network

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[3] Metropolitan Transportation Commission. "Plan Bay Area: Technical Summary of Preferred Scenario Equity Analysis Methodology." May 4, 2012. Page 2.

[4] The Authority is in the process of trying to assess affordability as a measure of network quality as well. The team was limited by the MTC's analysis, which took transit fares at published values for a region-wide analysis. For a San Francisco-specific analysis, the team would want to take into account the large population that takes advantage of programs that heavily discount fares.

    - Transfer Rate to Popular Destinations
    - Pavement Quality
- Transportation System Performance
    - Transit Speeds
    - Transit Reliability
    - AM-Peak Transit Crowding
    - Travel Time to Popular Destinations
    - Vehicle Miles Traveled

For each metric, the team calculated the performance distribution of San Francisco transportation analysis zones (zones), including those that experience the best conditions (either the top quintile or other appropriate threshold), the worst conditions (bottom quintile or other appropriate threshold), and average performance for each metric. The team identified metrics for which CoCs are overrepresented in either the top or bottom category. The team also identified metrics for which top or bottom quintiles are geographically clustered in certain neighborhoods, regardless of CoC status.

The analysis was only able to analyze projected future conditions for transfer rate, transit crowding, travel time, and vehicle miles traveled.

The tables on pages six through nine summarize the high-level findings. Table I-1 summarizes this study's socioeconomic findings: That the greatest disparities for CoCs are in the safety metrics. Table I-2 summarizes geographic equity findings. The table identifies a subset of system metrics that, though performance is clustered geographically, do not indicate an inequitable condition because performance is correlated with density and/or topography or is otherwise expected.

Figure 1: Communities of Concern

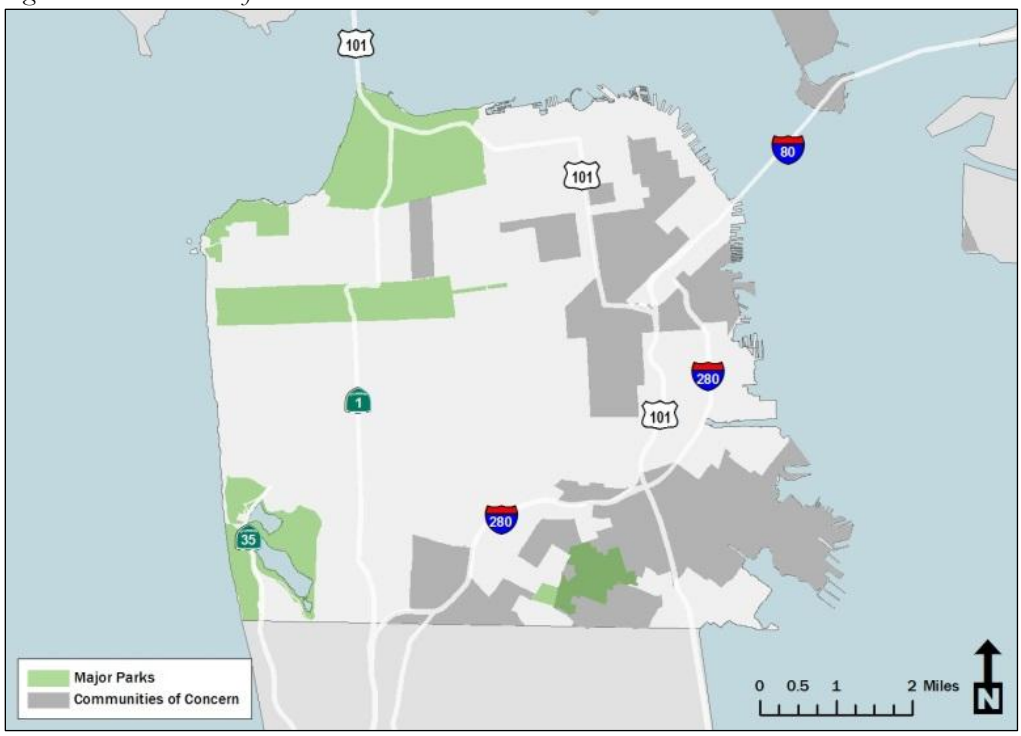


Figure 2: SFCTA 12-District System

Table I-1: Socioeconomic Findings

Metric	Socioeconomic Disparities?	Notes
Safety		
Pedestrian Injuries	YES	Injuries concentrated in highest density neighborhoods, many of which are communities of concern
Bike Injuries	YES	Injuries concentrated in highest density neighborhoods, many of which are communities of concern
Street- and Transit-Related Crime	YES	High-crime zones concentrated in communities of concern
Transportation-Related Air Quality Impacts	NO	Most particulate exposure around elevated freeways and high-volume northeastern streets
Transportation Network Quality		
High-Quality Transit: Access to the Rapid Network	NO	Lower-density southern and western areas have least access
High-Quality Transit: Access to Regional Transit	NO	Major gaps in access in Sunset, Richmond, and southeast/ southwest edges of the city
Transfer Rate to Popular Destinations	NO	Zones in southern and western parts of the city need to transfer most
Pavement Quality	NO	On average, best pavement conditions in northeast districts, worst conditions in downtown-adjacent dense districts.
Transportation System Performance		
Transit Operating Speeds	YES	Slowest speeds in downtown core, fastest speeds along freeways and arterials.
Transit Reliability	NO	Links with most reliable speeds concentrated downtown (reliably slow), high variability on arterials.
Morning Peak Transit Crowding	NO	Passengers from the outer neighborhoods, Western Market area experience the most crowding
Travel Time to Popular Destinations	NO	Southern and western parts of the city see longest travel times
Vehicle Miles Traveled	NO	Higher VMT in the city's lower-density southern and western zones

Table I-2: Geographic Findings

Metric	Geographic Disparities?	Notes
Safety		
Pedestrian Injuries	YES	Injuries concentrated in highest density neighborhoods, many of which are communities of concern
Bike Injuries	YES	Injuries concentrated in highest density neighborhoods, many of which are communities of concern
Street- and Transit-Related Crime	YES	High-crime zones concentrated in communities of concern
Transportation-Related Air Quality Impacts	NO	Most particulate exposure around elevated freeways and high-volume northeastern streets
Transportation Network Quality		
High-Quality Transit: Access to the Rapid Network	YES*	Access to the Rapid Network is correlated with density and topography. Lower-density and hilly southern and western areas have least access.
High-Quality Transit: Access to Regional Transit	YES*	Access to Regional transit is correlated with density and topography. Least access in Sunset, Richmond, and southeast/ southwest edges of the city.
Transfer Rate to Popular Destinations	YES*	Transfer needs are correlated with density and topography. Zones in southern and western parts of the city need to transfer most.
Pavement Quality	NO	On average, best pavement conditions in northeast districts, worst conditions in downtown-adjacent dense districts.
Transportation System Performance		
Transit Operating Speeds	YES	Slowest speeds in downtown core, fastest speeds along freeways and arterials.
Transit Reliability	YES	Links with most reliable speeds concentrated downtown (reliably slow), high variability on arterials.
Morning Peak Transit Crowding	YES	Passengers from outer neighborhoods, Western Market area experience the most crowding
Travel Time to Popular Destinations	YES*	Transit travel times are correlated with density and topography. Southern and western parts of the city see longest travel times.
Vehicle Miles Traveled	YES	Higher VMT in the city's lower-density southern and western zones

*These characteristics of the transportation network are related to density and topography, and so some degree of geographic disparity may be expected.

Metric	Bay-shore*	Down-town*	Hill Dists	Marina/ N. Hts	Mission/ Potrero*	N. Beach/ Chntwn	Noe/ Glen/ Bernal	Outer Mission*	Rich.	SoMa*	Sunset	W. Mkt
Safety												
Total Ped Injuries	●	○	●	●		○	●	○		○	●	○
Ped Injuries per Million Predicted Crossings	○	●		●		●	○	○		●	○	
Bike Injuries	●	○	●	●	○				●	○		○
Street- and Transit-Related Crime	○	○	●	●	○				●		●	○
Transportation-Related Air Quality Impacts	○				○	●			●			
Transportation Network Quality												
High-Quality Transit: Access to the Rapid Network	●	●	○	○			○			●	○	●
High-Quality Transit: Access to Regional Network		●	○		●		●	●	○	●	○	
Transfer Rate to Popular Destinations	○	●			○**	●	○			●		●
Pavement Quality		●			○	●						○

○ Significantly Worse than City Average ● Significantly Better than City Average ● Over/Underrepresented in Best/Worst Categories

Metric	Bay-shore*	Down-town*	Hill Dists	Marina/ N. Hts	Mission/ Potrero*	N. Beach/ Chntwn	Noe/ Glen/ Bernal	Outer Mission*	Rich.	SoMa*	Sunset	W. Mkt
Transportation System Performance												
Transit Operating Speeds	●	○	●			○	●		●		●	
Transit Speed Reliability		●				●			○	○		
Morning Peak Transit Crowding	○	●		●			○		○		○	○
Travel Time to Popular Destinations	○	●			●	●	●	○		●	○	●
VMT	○	●	○	●		●	○	○		●	○	●

○ Significantly Worse than City Average ● Significantly Better than City Average ● Over/Underrepresented in Best/Worst Categories

* Districts that have a disproportionate share of TAZs identified as Communities of Concern.
** Mission/Potrero trips still involve disproportionately more transfers in 2040, but the district is predicted to have 33% more zones in the top quintile vs. the citywide average, down from 74% more in 2012.

Community-based Neighborhood Transportation Plans (NTPs), developed in response to the MTC's Lifeline Transportation Program and as a recommendation of the 2004 Countywide Transportation Plan, identify the transportation needs and priorities of residents and workers in areas that include Communities of Concern. To date, four NTPs have been completed: in the Western SoMa, Bayview Hunters Point, Mission/Geneva, and Tenderloin/Little Saigon. Each one of these neighborhoods encompasses one or more CoCs. Where the metrics defined in the preceding tables have been identified as concerns in these NTPs, they are discussed below.
Some useful performance metrics are not included in this analysis because data is not available:

- Transit affordability: San Francisco has many programs that help make transit more affordable for certain groups of people, like young people and seniors, but there is no currently available spatial data on who takes advantage of such programs.
- Pedestrian infrastructure provision: Citywide data is unavailable for measures of the quality of the pedestrian environment, including factors like sidewalk widths and the location of bulb-outs.
- Bike network: While we do have spatial data defining the city's current bike network, we are still working on a methodology for estimating geographic and socioeconomic access to the network.
- Access to the Muni owl network, Congestion, and Access to Regional Job Centers: We are still working on a methodology for analyzing these metrics.
- Reliability: We were unable to obtain spatial data from SFMTA on switchbacks, on-time pull-outs, or other measures of reliability. The closest metric with spatial data available is transit speed differential.

The Authority will use the findings of this analysis to inform the SFTP's investment scenarios and to help determine whether and how discretionary transportation revenues should be targeted to address equity issues. The SFTP team will seek agency and public input on the Investment Scenario response to the equity findings in summer 2013.

SAFETY

Pedestrian Safety

This equity analysis looks at pedestrian safety in two ways using 2007-2011 data from the Statewide Integrated Traffic Reporting System (SWITRS). The analysis looks at both total incidents over the time period within each analysis zone and the rate of pedestrian injuries, relative to predicted street-crossing volumes from the city's *Pedestrian Volume Model*.[5]

Total pedestrian injuries were not distributed in a geographically equitable way within San Francisco during the data period. Certain neighborhoods in the city disproportionately experienced the greatest number of pedestrian injuries. Pedestrian injuries are concentrated in the city's densest districts: Downtown, North Beach/Chinatown, SoMa, the Mission, and Western Market (see *Figure 3*). These are areas with the highest levels of population and employment, and thus the most daily pedestrian activity. Pedestrian injury hot spots are scattered throughout the rest of the city, including an area with wide arterials near I-280 in the Outer Mission and in the center of Golden Gate Park, near 19th Avenue and Crossover Drive.

These patterns change when the data is normalized by predicted total crossing volume to show where pedestrian collision rates are the greatest. With this approach, zones in outlying districts show the worst conditions, with large concentrations of zones in the Bayshore, Noe/Glen/Bernal, Outer Mission, and Sunset neighborhoods falling in the worst 40 percent of zones citywide (see *Figure 4*). Areas of the city with the highest total pedestrian injuries also tend to have the highest overall crossing volumes, and thus they have relatively lower rates of injury.

The distinction between total injuries and injury rate is important for understanding the socioeconomic equity of pedestrian safety. By total pedestrian injuries, CoC zones are far overrepresented in the worst two quintiles and far underrepresented among the zones with zero injuries (see *Figure 5*). By collision rate, the city is more equitable. CoC zones are about on par with the rest of the city in the top quintile and are in fact underrepresented in the next quintile. However, CoCs are still underrepresented among the zones with injury rates close or equal to zero.

All four Neighborhood Transportation Plans identify pedestrian safety as an issue in their communities. In Western SoMa, strong community support for mid-block crossings at alleys, concerns about personal safety, and interest in traffic calming measures reflect the area's high levels of pedestrian activity. The Mission/Geneva and Tenderloin/Little Saigon NTPs also identified pedestrian safety as issues in these areas where high numbers of pedestrians exist alongside heavy vehicle traffic. The Mission/Geneva NTP specifically recommended specific intersection improvements that include better crossings and wider sidewalks for pedestrians. Similar changes to pedestrian infrastructure, including corner bulbs, traffic calming, and improved crosswalks, were recommended in the Tenderloin NTP. While the Bay View Hunters Point NTP identified parking issues as a main concern, the top issue was cars parked on sidewalks, which present hazards to pedestrians.

[5] SFMTA and SFCTA (2011). *San Francisco Pedestrian Volume Model.*

Figure 3: Pedestrian Collisions (2007-2011)

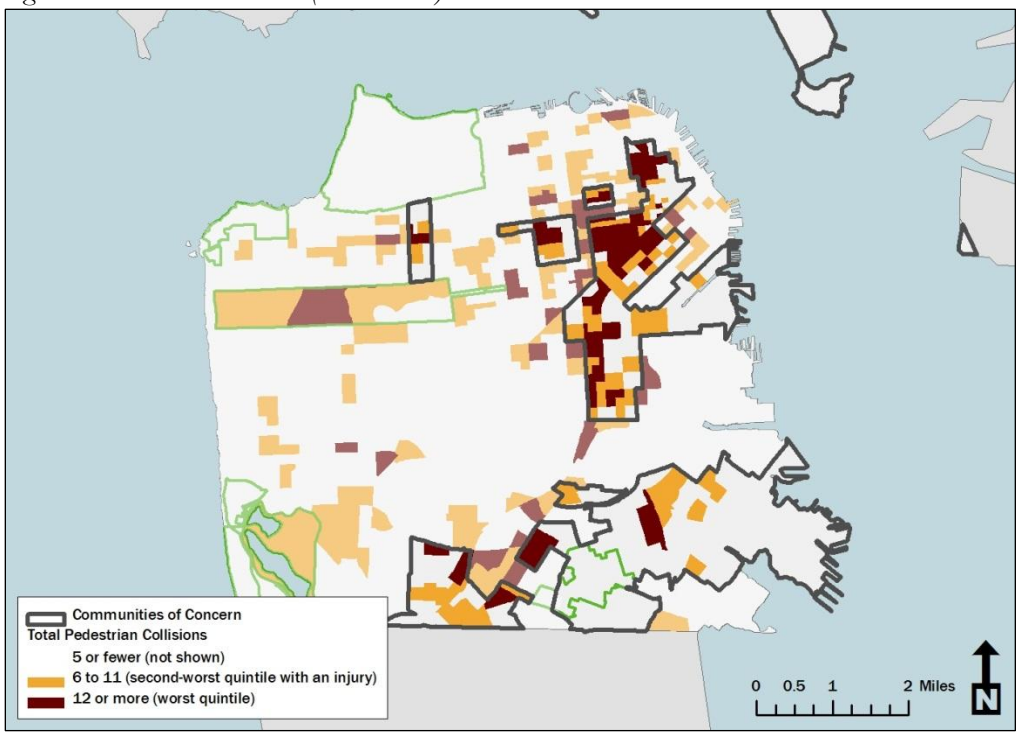
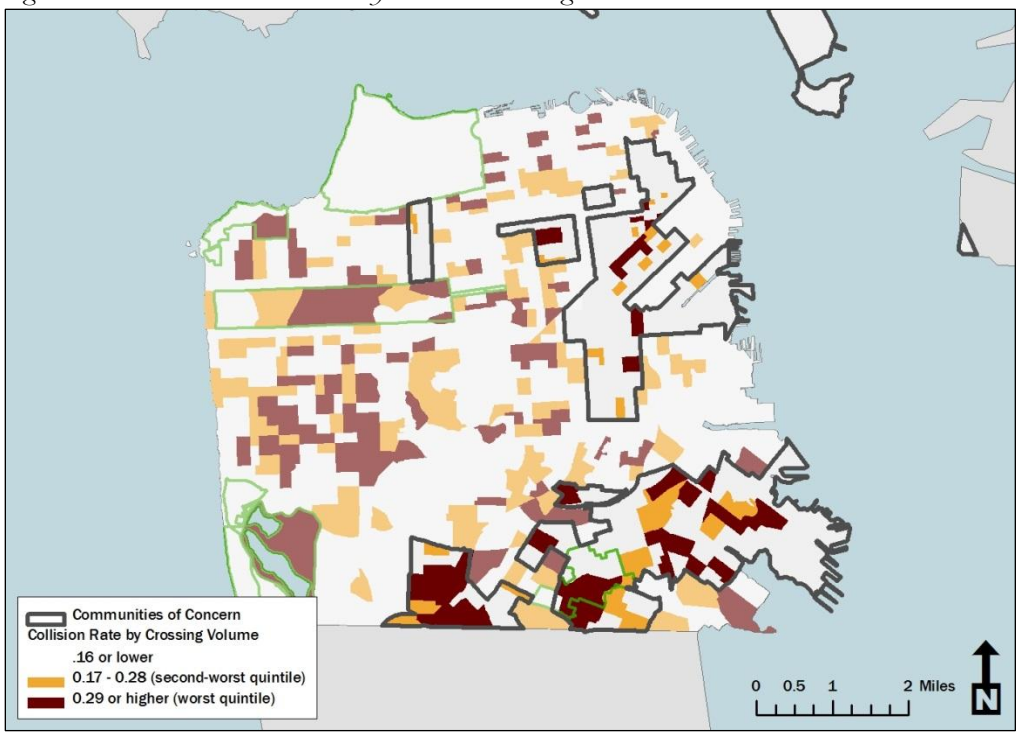
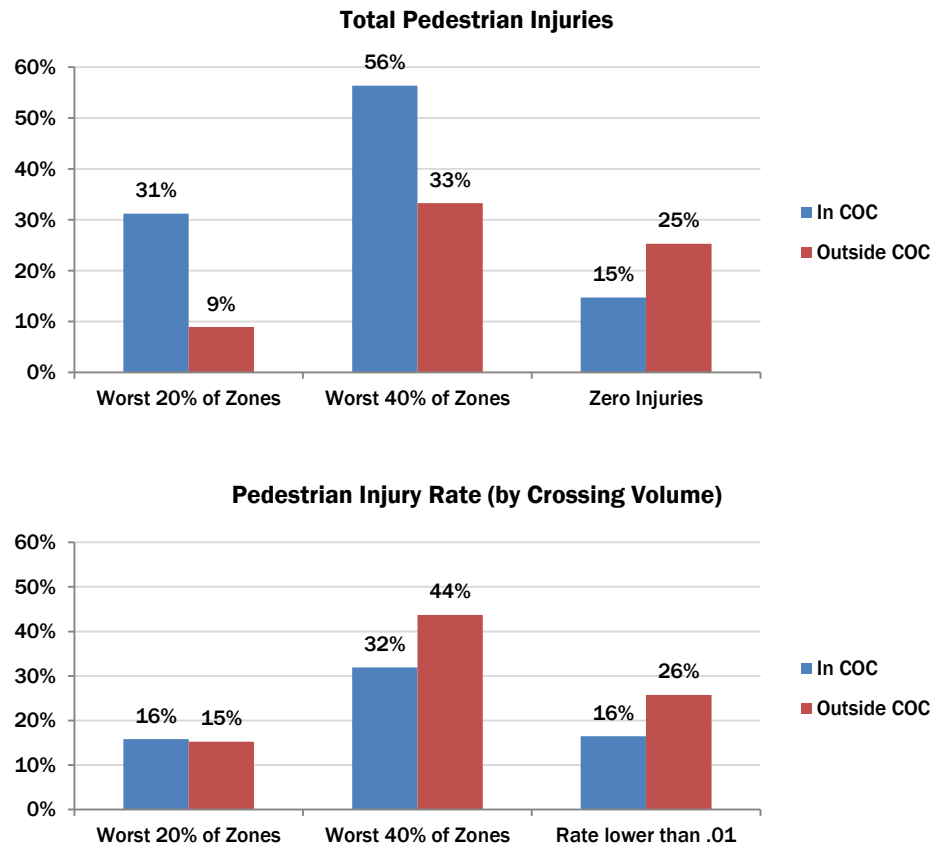

Communities of Concern
Total Pedestrian Collisions
5 or fewer (not shown)
6 to 11 (second-worst quintile with an injury)
12 or more (worst quintile)
0 0.5 1 2 Miles
N

Figure 4: Pedestrian Collision Rates by Predicted Crossing Volume[6]



[6] Injury data source: Statewide Integrated Traffic Reporting System (2007-2011). Predicted crossing volume: Pedestrian Volume Model (2012).

Figure 5: Distribution of Zones by Socioeconomic Status



Bike Safety

The analysis also used 2007-2011 SWITRS data to analyze bike injury patterns.

Bike injuries are concentrated in the city's densest districts and in areas that likely attract the highest rates of bike ridership because they have high quality bike facilities (see *Figure 6*). As with pedestrian injuries, high-injury areas include Downtown, SoMa, the Mission, Western Market, and parts of the city's major recreational facilities. All zones along the Panhandle and the major east-west bike route in Golden Gate Park (along John F. Kennedy Drive and bike paths that continue the route west of Crossover Drive) had more than 7 bike collisions between 2007 and 2011 (the highest category), as did the zone that covers Lake Merced Park.

Communities of concern are again over-represented in the worst category of zones (with more than 7 bike collisions in the four years): 20 percent of community-of-concern zones fall in this category, versus 8 percent citywide (see *Figure 7*). Fewer CoC zones also had zero bike collisions – a full 40 percent of zones citywide fell in this category, while only 26 percent of CoC zones were collision-free.

In the NTP process, the Bayview Hunters Point neighbors specifically addressed bicycle safety, recommending improved infrastructure to support bicycling as an alternative mode of transportation.

Figure 6: Bike Incidents by Nearest Intersection (2007-2011) and 2013 Bike Network[7]

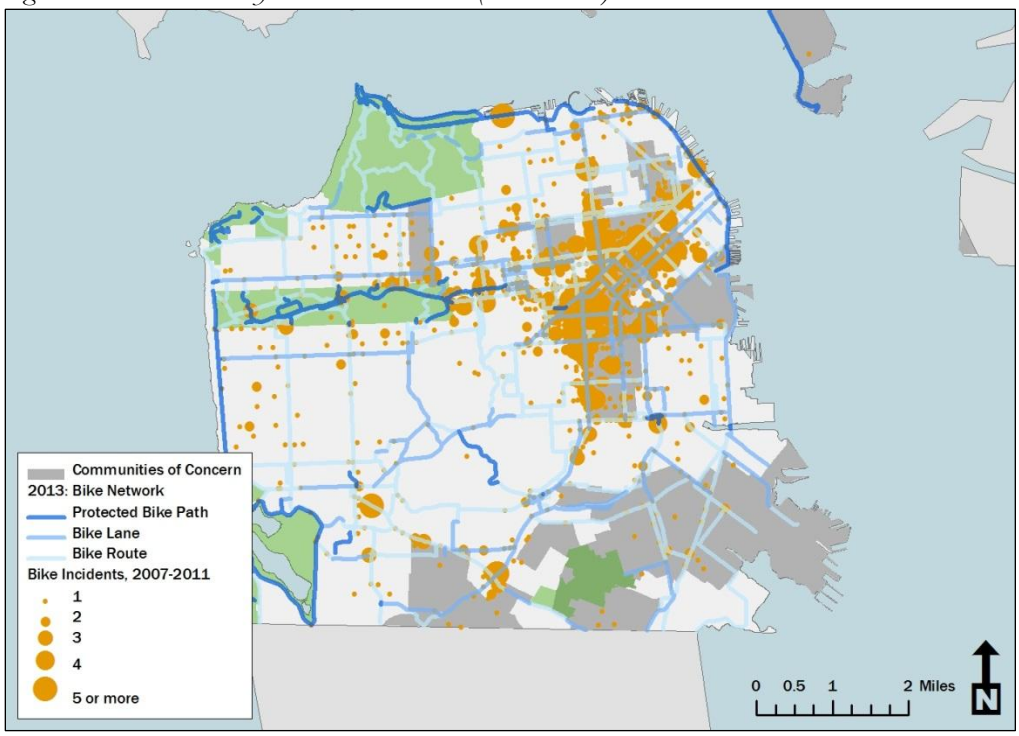
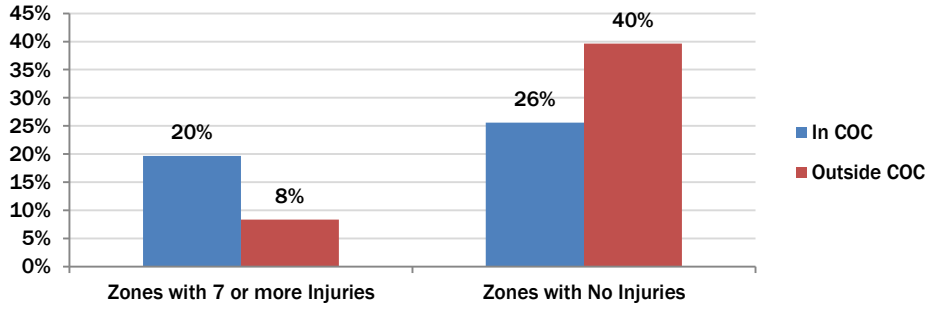


Figure 7: Bike Incidents (2007-2011) and Socioeconomic Status



Street and Transit-Related Crime

The analysis used crimes reported in San Francisco Police Department records as "robbery on the street" and "crimes against transit" as a proxy for the larger universe of crimes that take place in public spaces and might discourage transit ridership, pedestrian activity, and bike riding because of general personal security concerns. Unfortunately, only these two crime categorizations specify whether incidents happen in the public realm – all others are simply recorded by the block on which

[7] Injury data source: Statewide Integrated Traffic Reporting System (2007-2011).

they took place, whether they took place in a public space or not. The SFPD records cover the period from January 1, 2003 through mid-February 2013.

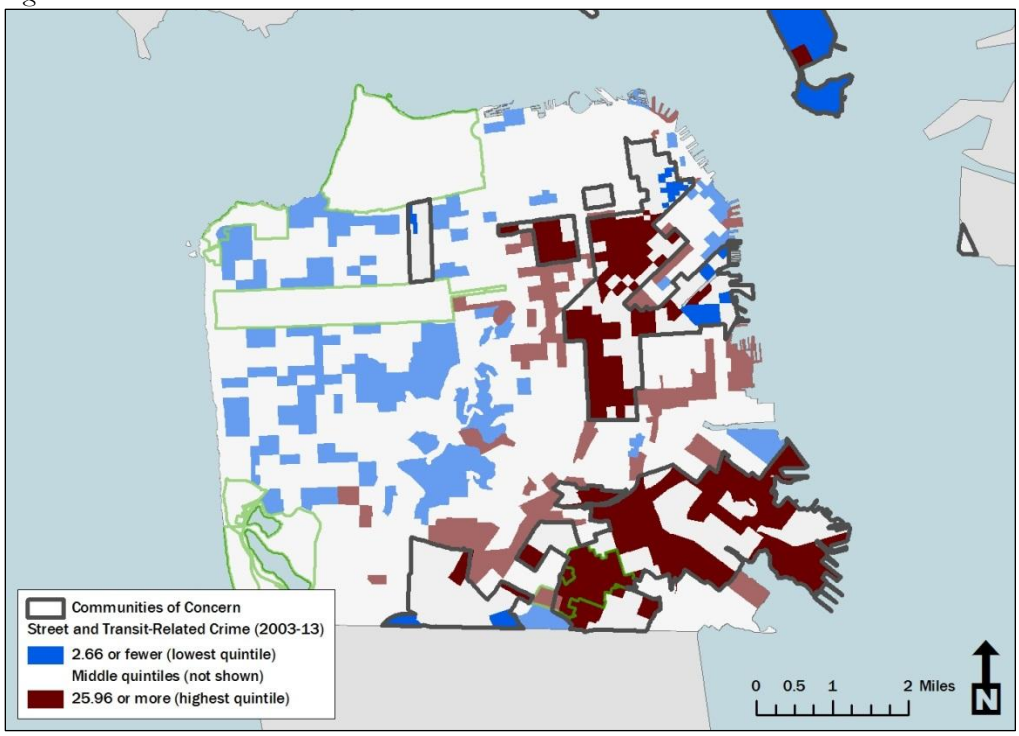
Zones with high rates of street and transit-related crime are concentrated in the city's dense downtown, but numerous zones in the Mission/Potrero, Bayshore and Western Market planning neighborhoods joined the top category (see *Figure 8*).

Most of the top 10 zones in total applicable crimes during the period fall in the Tenderloin, and all but one of the top 10 are categorized as communities of concern. When normalizing for the number of jobs and residents in each zone, CoCs fare worse. A full 41 percent of CoC zones fell in the top fifth of zones for street- and transit-crime rate, while just 13 percent fall in the bottom fifth.

Zones that are not categorized as communities of concern, meanwhile, are very underrepresented in the top fifth of zones by street- and transit-crime rate. Most of the Hill Districts, Sunset, Richmond, and Marina/Northern Heights are spared concentrations of such high rates.

Two of the Neighborhood Transportation Plans specifically addressed street and transit-related crime. Western SoMa community members expressed concern about vandalism and personal safety. The Tenderloin/Little Saigon NTP identified personal security on the street as a concern for participants in the planning process.

Figure 8: Street- and Transit-Related Crime[8]


Communities of Concern
Street and Transit-Related Crime (2003-13)
2.66 or fewer (lowest quintile)
Middle quintiles (not shown)
25.96 or more (highest quintile)
0 0.5 1 2 Miles
N

[8] Crime data source: San Francisco Police Department (2003-2013). Retrieved from *data.sfgov.org/Public-Safety/SFPD-Reported-Incidents-2003-to-Present/dyj4-n68b* on 2/16/13.

Transportation-Related Air-Quality Impacts

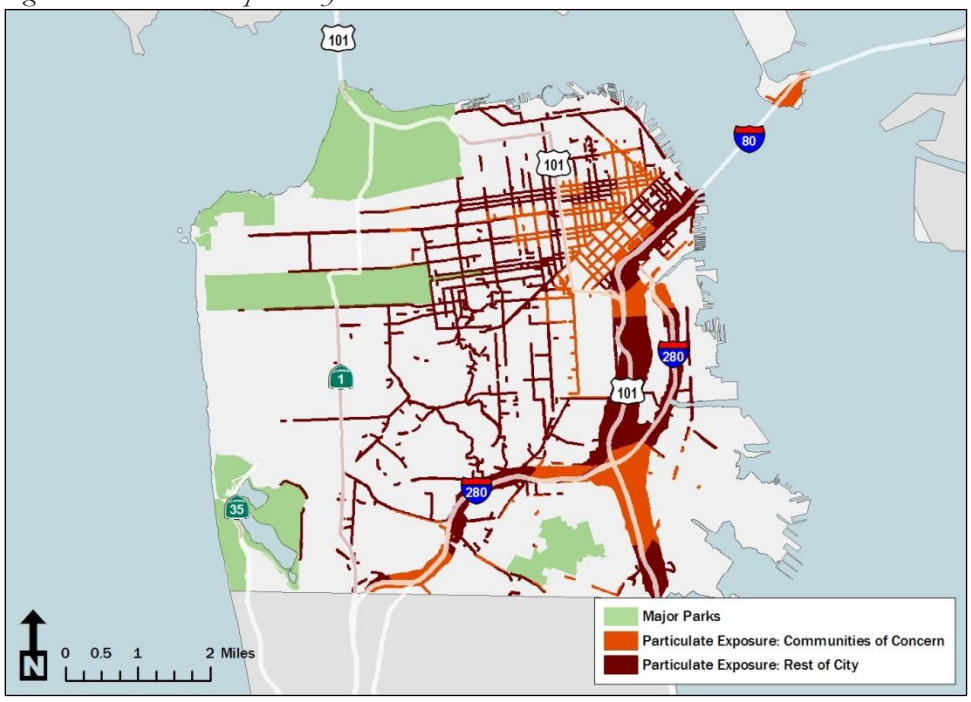
The analysis used data for transportation-related particulate exposure by parcel from 2008, calculated by the SF Department of Public Health.

Transportation-related particulate exposure concentrates around the city's high-volume arteries and near elevated freeways. The widest swaths of particulate exposure follow I-80, I-280, and Highway 101, which are elevated for large portions within the city. This mostly affects zones in the southern and eastern areas of the city (see *Figure 9*). The city's western districts see little particulate exposure, given lower traffic volumes, though the parcels around 19th Avenue, Geary Boulevard, Fulton Street, and Lincoln Way are important exceptions.

Despite the way freeways crisscross communities of concern in the southern portion of San Francisco, CoCs' particulate exposure rates are slightly low relative to the rest of the city. While 22 percent of non-CoC land area sees high particulate exposure rates, just 16 percent of CoC land does. An earlier version of MTC community-of-concern geography, which incorporated broader swaths of the SoMa, Bayshore, and Outer Mission districts into CoCs, showed a much larger proportion of particulate exposure within CoCs (24 percent of exposed land within COCs vs. 17 percent outside).

None of the NTPs addressed air pollution as a concern, although that may be seen as an issue that lies outside the control of a neighborhood transportation plan.

Figure 9: Particulate Exposure by Socioeconomic Status[9]



[9] Source: San Francisco Department of Public Health (2008).

TRANSPORTATION NETWORK QUALITY

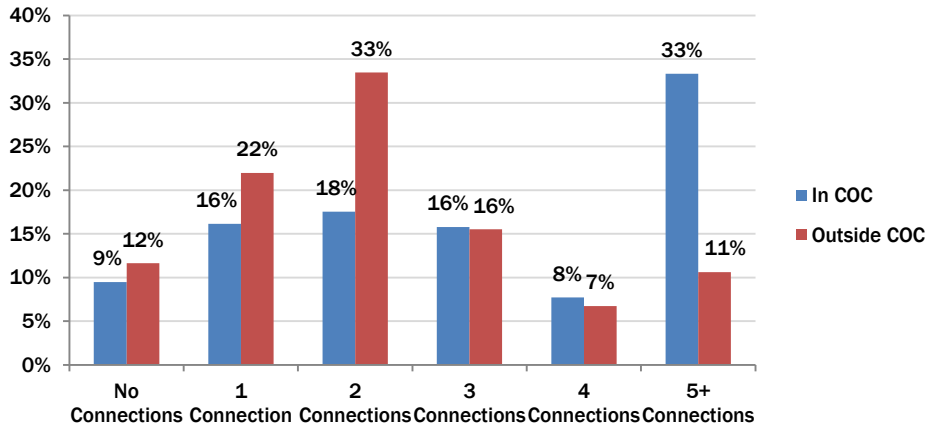
Access to High-Quality Transit: Rapid Network

The analysis looked at the number of connections to the Muni Rapid Network – including both bus and rail services – as one measure of access to high quality transit.

Access to the Muni rapid network is greatest in the zones along Market Street, where numerous rapid network lines converge on the way to and from the Ferry Building and Transbay Terminal. Other areas with high levels of access include zones where transit routes intersect, such as the area around the Balboa Park BART station. Portions of the city's lower-density or higher elevation areas in the west and southeast portions of the city have no direct access to the rapid network.

Communities of concern are generally quite well connected to the rapid network, relative to the rest of the city, in part because a large number of CoC zones are located near the city's core or along its eastern transit spine, which is served by the 8X, 9, and 9L lines. Thirty-three percent of CoC zones have access to 5 or more Rapid Network lines (just 11 percent of zones citywide get such access), while the number of CoC zones that have no short-walk access to the rapid network is 2 percent lower than the citywide figure (see *Figure 10*).

Figure 10: Rapid Network Access by Socioeconomic Status



Access to the Regional Transit Network

Regional transit access was also calculated by creating an index that gave heavy weight to direct regional rail access and some weight to regional bus access. Zones within ¼ mile of a regional transit bus stop (including those of Golden Gate Transit, AC Transit, and SamTrans) and zones within ½ mile of a regional rail stop (including those of BART and Caltrain) each gained points in the index. Regional-rail proximity was given a weight of 20, given passengers' abilities to travel deep into the region relatively quickly, and regional-bus-stop proximity was given a weight of one (though regional bus stops are often paired, giving such access an effective weight of two).

The best access to the regional system is concentrated in the densest parts of the city, including the Downtown and SoMa neighborhoods, where the regional system converges on Market and Mission streets and at the Transbay Terminal (See

Figure 12). Zones located along the BART and Caltrain corridors also see high index values. Almost the entire lower-density west side of the city sees zero direct regional transit access, outside of the areas along the Geary corridor in which Golden Gate Transit stops and the areas closest to the Daly City BART station and SamTrans service in the southwest corner of the city. The area between the Bayshore and 22nd Street Caltrain stops also has little or no direct regional transit access.

As with the Muni rapid network, communities of concern on the whole have significantly better access to the regional transit network than their counterparts in the rest of the city (see *Figure 13*). Just 16 percent of CoC zones have no direct access to the regional network, versus 52 percent of non-CoC zones, and 31 percent of CoC zones are in the highest category of access, versus just 6 percent of non-CoC zones.

The only NTP that addressed regional access was the Bay View Hunters Point NTP, which recommended considering adding an intermediary Caltrain station at Oakdale Avenue.

Figure 12: Access to the Regional Transit Network

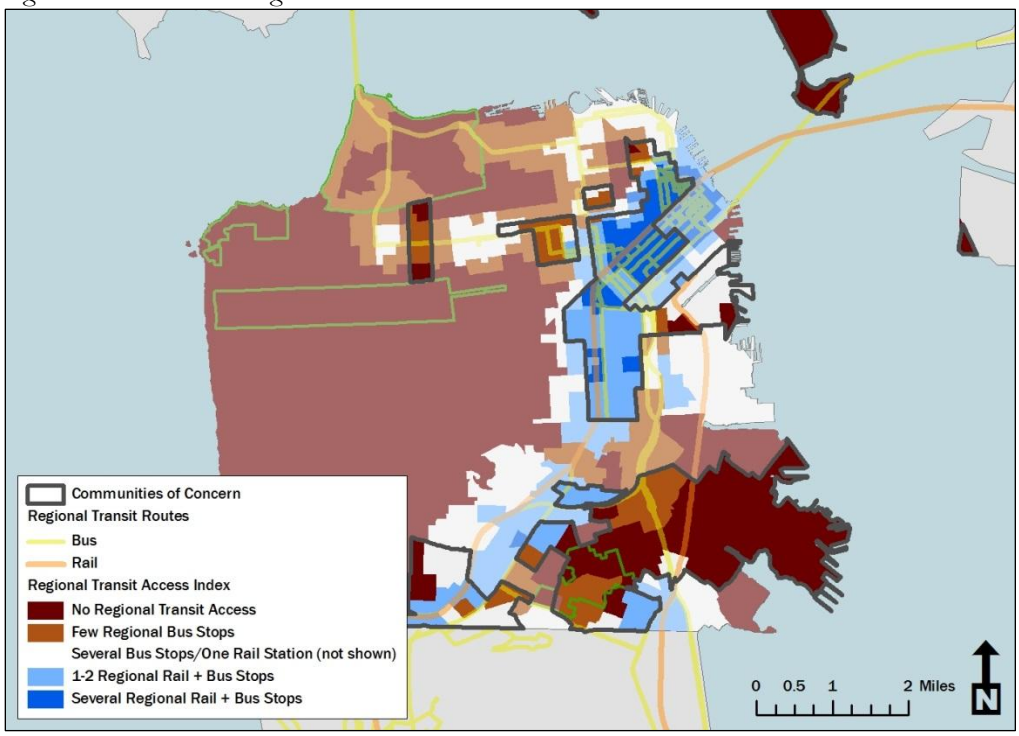
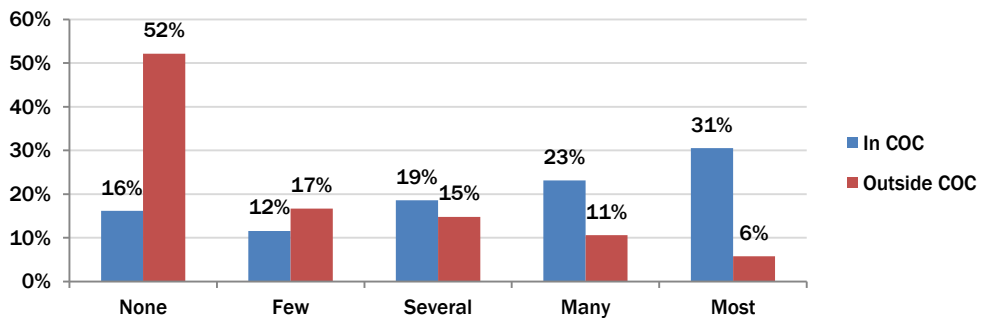


Figure 13: Access to the Regional Transit Network by Socioeconomic Status



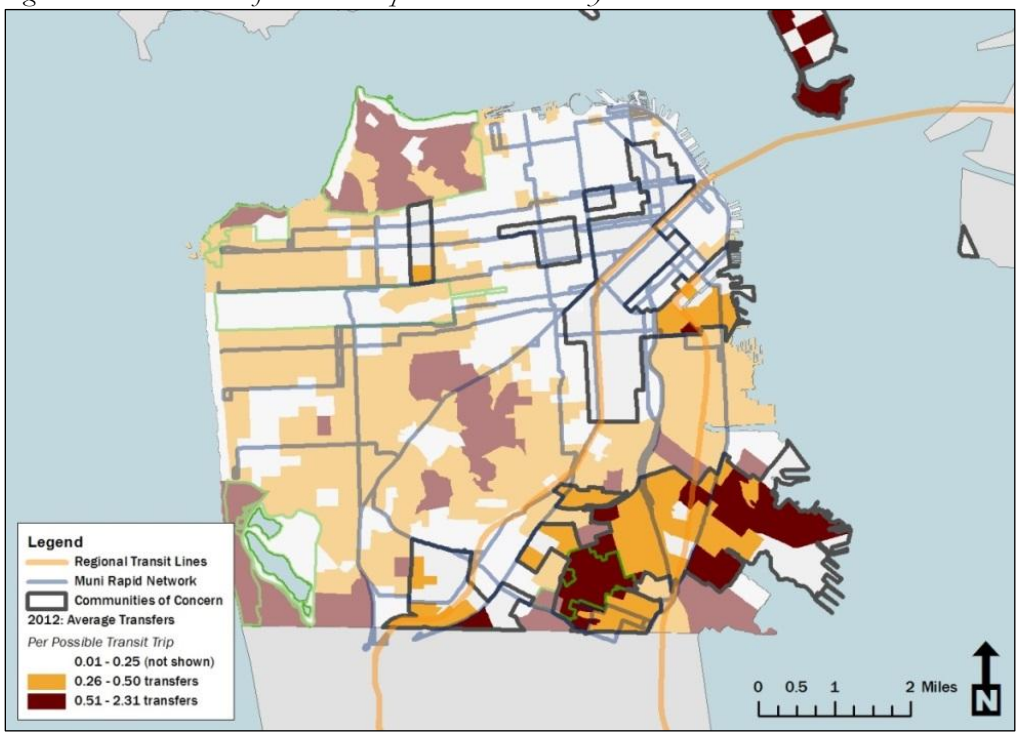
Transit Transfer Rate to Popular Destinations

To understand patterns of equity in transit transfer rates, the analysis looked at how often riders need to change lines, on average, when traveling from one zone to another. The analysis looked at how many transfers would be required for potential trips to all zones and developed an average transfer rate by weighting destination zones by their popularity in the morning peak.
Predictably, lower-density zones far outside the northeastern core experience higher rates of transfers per transit trip than those in or with direct access to the core (see
Figure 14). The pattern is projected to be about the same in 2040 as it is in 2012.

Almost no zones in the Richmond are in the worst fifth of zones citywide in transfer rates because the district's arterials, and thus its major bus lines, lead directly into the downtown core. Similarly, zones around stops on the Muni Light Rail system are generally not in the worst category. Parts of the city with street grids that run in a different pattern from those of downtown and SoMa or do not connect directly to those areas see higher transfer rates. Groups of affected zones include large numbers in the southeastern part of the city. Zones in the inner parts of Twin Peaks must, predictably, transfer at higher rates because of the area's topography.

Communities of concern tend to fare better in transfer rates than the citywide average, likely in large part because of the number of CoC zones in the transit core and along the T-Third light rail line.

Figure 14: 2012 – Transfer Rate to Popular Destinations by Zone[10]



[10] Source: SF-CHAMP 4.3.

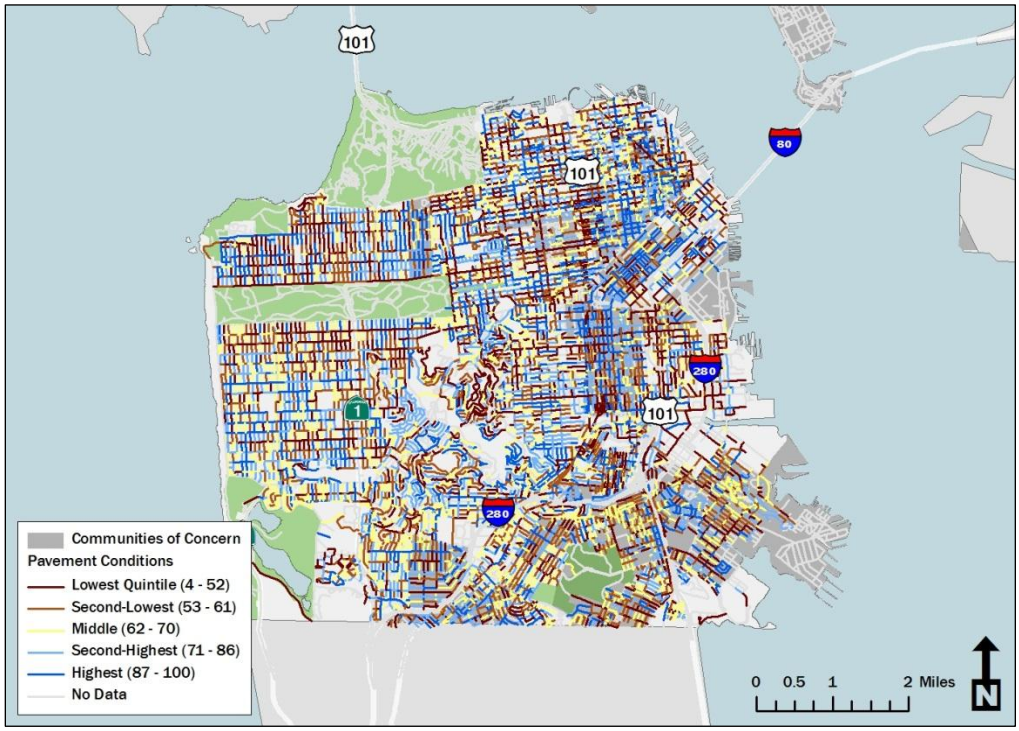
Pavement Quality

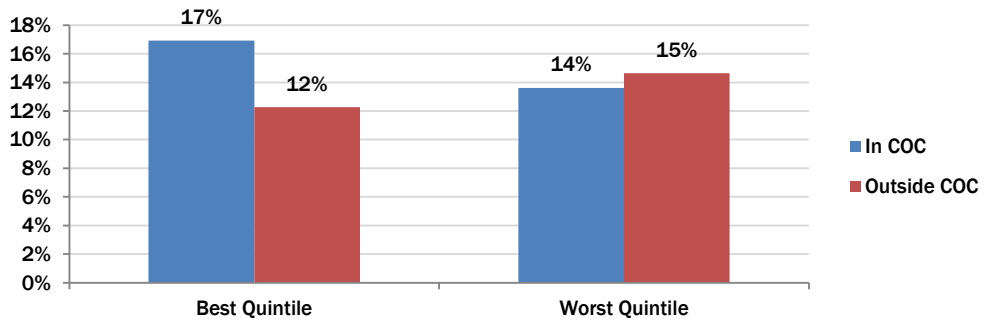
The analysis examined pavement quality using April 2013 Pavement Condition Index score data from the Department of Public Works. The score rates the smoothness and consistency of pavement conditions on a 0 to 100 scale. Most scores in the dataset are based on observations within the last three years.

Pavement quality is a bigger geographic equity concern than a socioeconomic one. The city's dense core neighborhoods tend to have the highest PCI scores, while core-adjacent dense districts tend to have the lowest scores (see Figure 15). Downtown and North Beach/Chinatown are both disproportionately represented in the best quintile of scores. Mission/Potrero and Western Market are overrepresented in the worst category.

Communities of concern are overrepresented in the best quintile and slightly underrepresented in the worst one.

Figure 15: Pavement Condition Index Scores





TRANSPORTATION SYSTEM PERFORMANCE

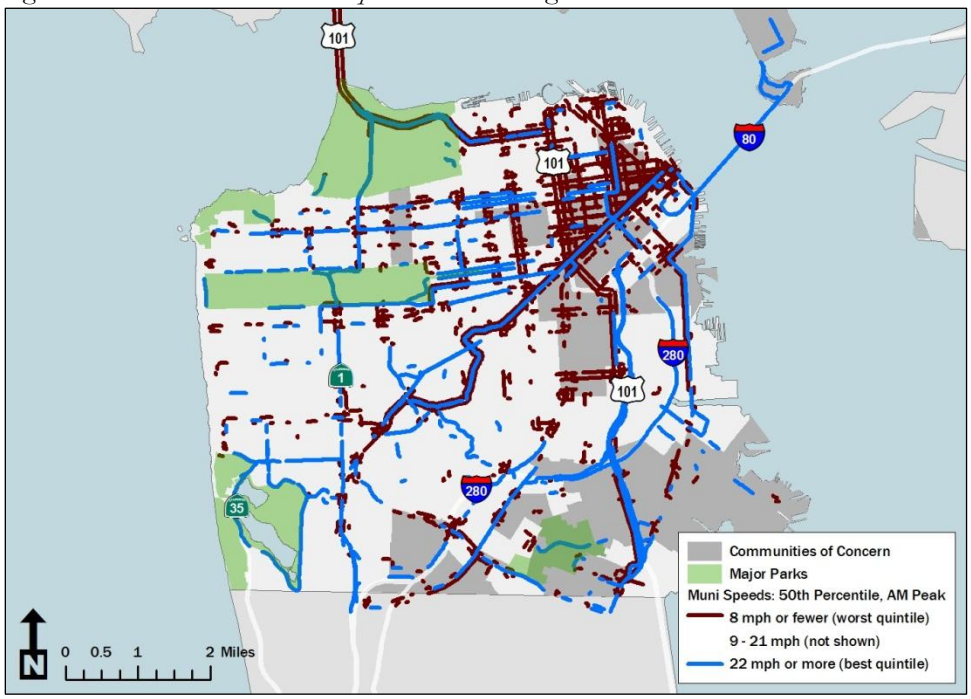
Transit Operating Speeds

The analysis used speed in the morning peak period as one measure of transit conditions.[11] This issue is most visible in services that run on surface streets in mixed traffic, as do most bus lines in the city's northeast corner (see *Figure 16*). Pockets of low-speed service also are observed along congested arterials like San Bruno Avenue, 3rd Street, and Geneva Avenue. Transit services that run in their own rights of way show the highest average speeds (i.e. underground services on Market).

Communities of concern disproportionately experience slow transit speeds. Just 15 percent of transit that serves CoCs falls in the top 20 percent of speeds citywide, while 26 percent of transit that serves CoCs falls in the bottom 20 percent. This is in part because of the high concentration of communities of concern in the dense core, which includes the two neighborhoods (Downtown and North Beach/Chinatown) that perform significantly worse than the city average on this metric.

Two of the NTPs specifically mentioned transit speed as a community concern. The Bayview Hunters Point community identified transit speeds along Third Street as a concern. The Mission/Geneva NTP recommended changes aimed at improving transit travel times, including reducing double parking and providing left-turn lanes.

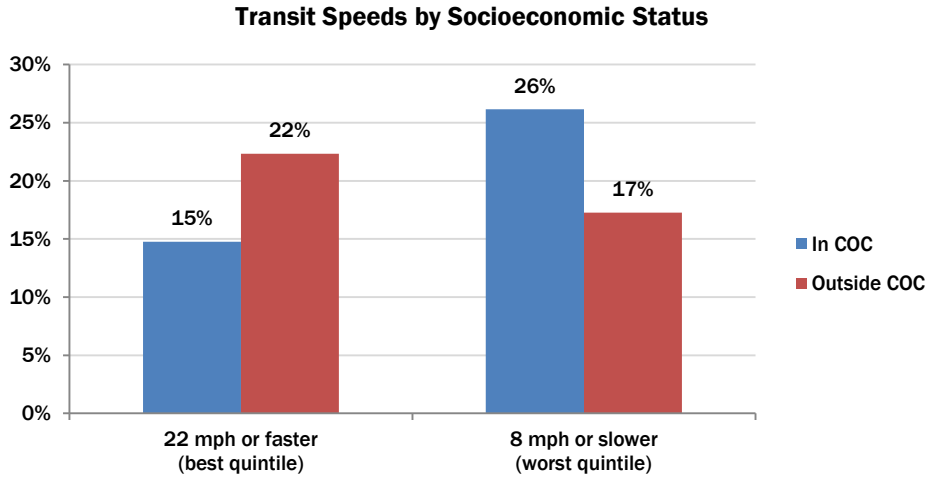
Figure 16: 50th Percentile Transit Speed in the Morning Peak Period[12]



[11] This analysis uses the 50th percentile speed.

[12] Source: SFMTA Automatic Vehicle Locator data (2013). Data preparation credit: Eric Fisher.

Figure 16 Continued: 50th Percentile Transit Speed in the Morning Peak Period



Transit Speed Variability (Reliability)

The analysis compared 5th and 50th percentile speeds in the morning peak period as a measure of transit reliability. There are more direct ways to measure transit reliability, but data was unavailable on metrics like turn-backs, bus bunching, or other more tangible signs of reliability.

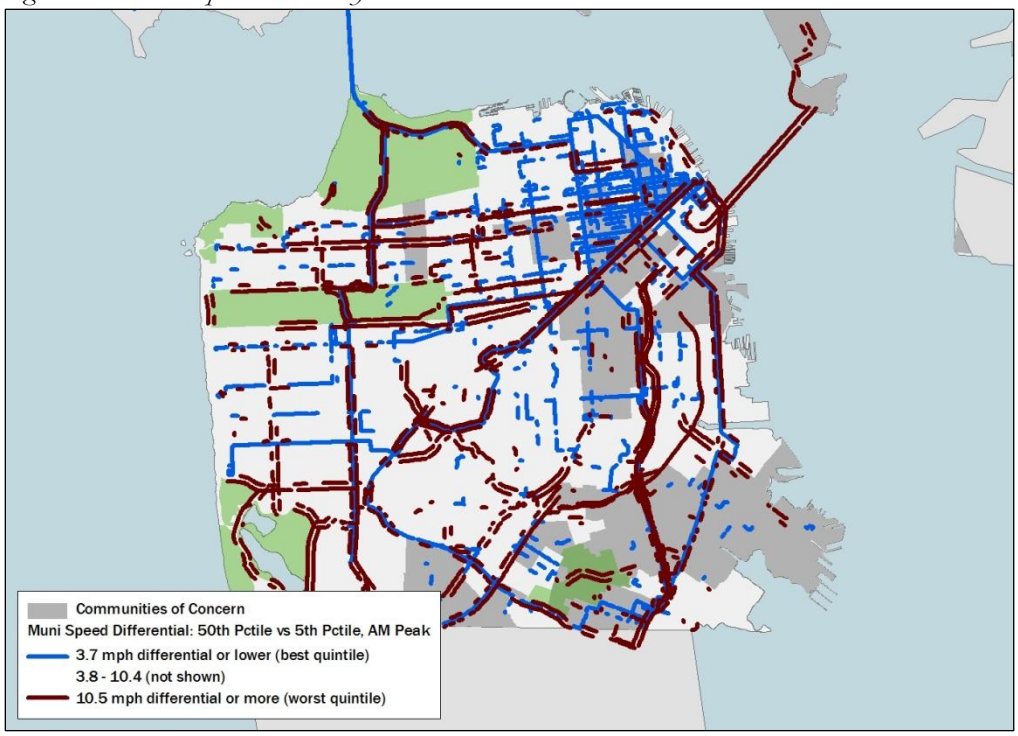
Geographically, the transit-speed variability map is almost the inverse of the transit speed map: The most consistent transit speeds cluster on high-volume downtown streets, while the most variable links are on the city's major arterials and freeways (See

Figure *1*7). This is in part because speeds are universally slow downtown, limiting the potential for variability. Speeds can get much faster on freeways and major arterials, but with congestion or sporadic delays, speeds can get much slower.

The links with the highest variability are about evenly distributed between communities of concern and other zones, as are those with the lowest variability.

Three NTPs addressed the issue of transit reliability in their final reports. Bay View Hunters Point experienced transit service cuts as a major disruption. Mission/Geneva community members identified transit reliability as a concern, and made several recommendations aimed at improving transit service. In the Tenderloin NTP, reliability was one of the transit issues the plan addresses, recommending transit-only lanes, consolidating some routes, installing NextBus signs information signs, and reassessing the location of loading zones in relation to bus stops.

Figure 17: Transit Speed Variability


Communities of Concern
Muni Speed Differential: 50th Pctile vs 5th Pctile, AM Peak
3.7 mph differential or lower (best quintile)
3.8 - 10.4 (not shown)
10.5 mph differential or more (worst quintile)

Transit Crowding in the Peak Hour of the Morning Commute

The analysis measured the impact of transit crowding on travelers to and from different parts of the city in two ways. For geographic equity, the analysis used SF-CHAMP model data and looked at which of the 12 San Francisco neighborhoods transit riders on crowded or overcapacity Muni lines were going to and coming from, and generated a percentage of person-hours traveled in each condition based on how long such riders were on that line. For socioeconomic equity, the analysis calculated a similar breakdown by the traveler's origin-district CoC status. A portion of a transit line is considered "crowded" if it is more than 85 percent full and "overcapacity" if it is more than 100 percent full.

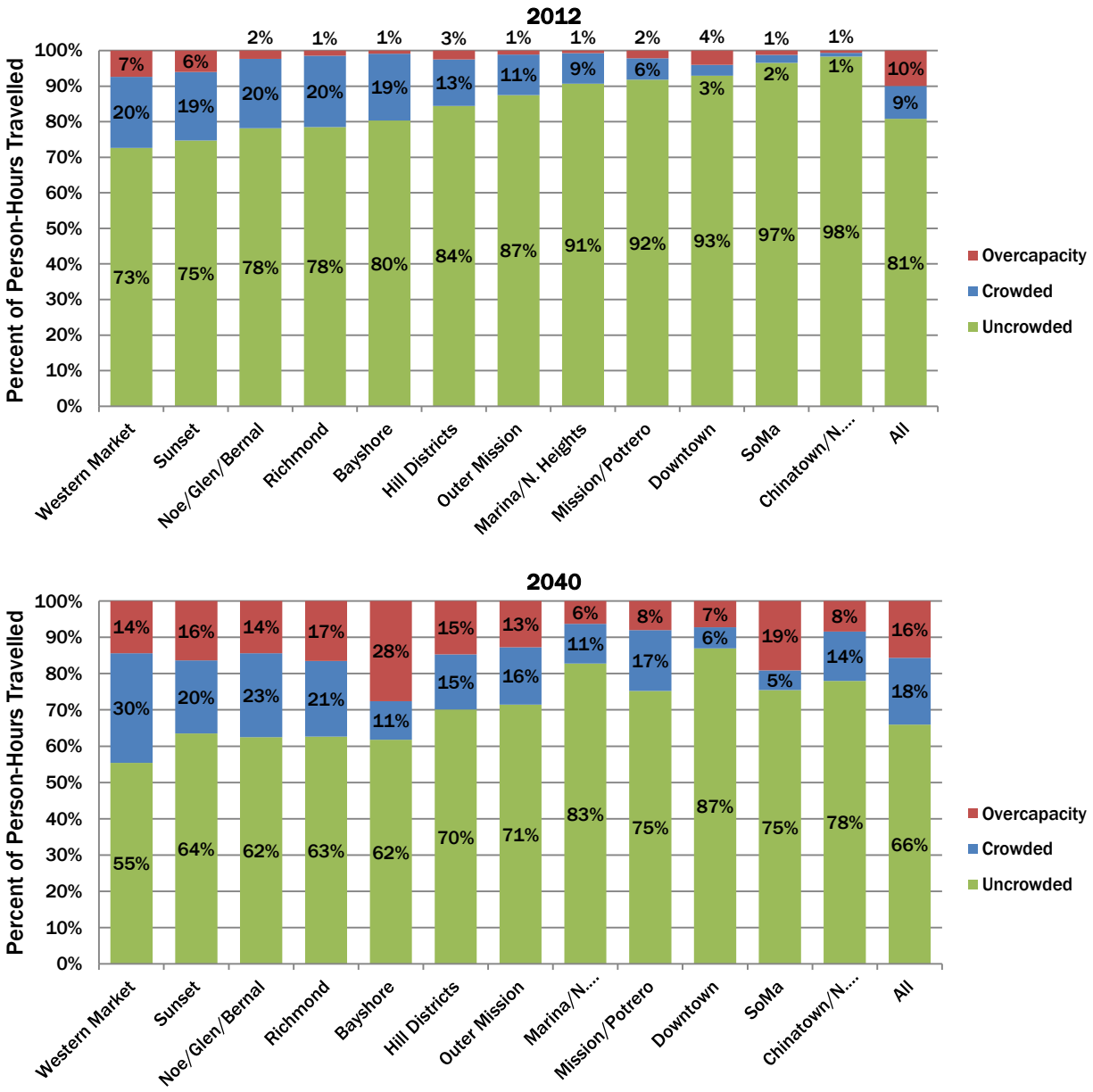
In 2012, transit riders who began their trip in the Western Market neighborhood (generally covering the Western Addition, Hayes Valley, the Castro, and the Lower/Upper Haight) spent the most PHT spent in crowded or overcapacity conditions. Other travelers that experienced high proportions of such conditions began their trips in outlying districts in the western and southern portions of the city. Riders who got on transit in the core districts – Downtown, SoMa, and Chinatown/North Beach – each experienced the lowest proportion of crowded conditions. This is likely because many people traveling from these areas in the morning peak are using transit in a reverse-commute direction. A portion of such people may also simply walk or bike to work – those whose destinations are the same as riders of crowded transit vehicles downtown may live close enough to avoid crowded transit vehicles altogether.

The 2012 pattern is projected to be roughly the same in 2040, though all districts experience significantly more PHT in crowded/overcapacity conditions (see *Figure 18*). One notable exception is that those with Bayshore neighborhood origins see a dramatic increase in overcapacity person-hours travelled.

The high rates of crowding experienced by riders from the Western Market neighborhood run counter to the general density and topography-related transit-crowding patterns.

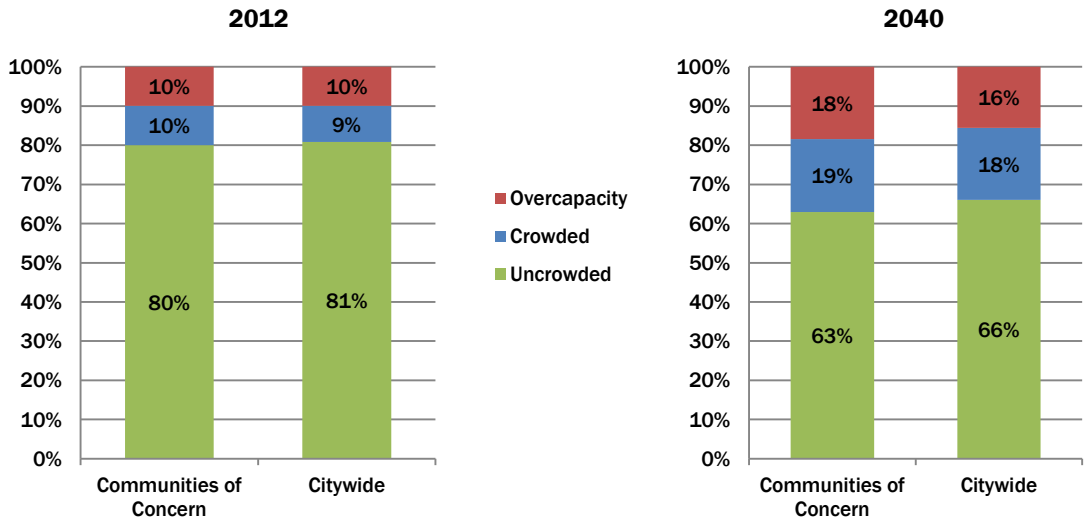
Communities of concern were not disproportionately burdened by crowded or overcapacity conditions in 2012, but they are projected to be slightly worse off in this regard in 2040 (see *Figure 19*). In 2012, about 20 percent of total PHT from CoCs were in crowded or overcapacity conditions, versus 19 percent citywide. By 2040, a projected 37 percent of CoC-rider PHT are expected to be in such conditions, versus 34 percent citywide.

Figure 18: 2012 and 2040 – Crowding Experienced by Transit Riders, by Origin District in the Morning Peak[13]



[13] Source: SF-CHAMP 4.3.

Figure 19: 2012 and 2040 – Crowding Experienced by Communities of Concern vs. Citywide Average[14]



Transit Time to Popular Destinations

To understand patterns of equity in transit conditions, the analysis looked at the average transit travel time from one zone to all other zones. Travel times to each zone were weighted by the popularity of the zones as a destination.

Given that the most popular and highest-density parts of San Francisco are in the northeastern quadrant, the highest and lowest average transit times per transit trip to those destinations group in a fairly predictable geographic pattern: Zones in the worst fifth in travel time (both in 2012 and SFCTA's 2040 projection) cluster on the southern and western edges of the city (see *Figure 20*). Areas with more challenging topography also see longer travel times on average.

The pattern changes when looking at changes in travel time between 2012 and the projections for 2040. Because the 2040 "no project" scenario incorporates transit improvements that are under construction or those for which money is already allocated, zones along the Geary BRT corridor and the T-Third light rail line all see significant travel-time improvement. The latter areas likely see this benefit because the Central Subway will provide much faster and more direct access to the city's most popular zones by 2040 (see *Figure 21*). Several other zones in the southeast neighborhoods see travel times increase by two minutes or more. This is likely because of the projected increases in congestion in the southeastern neighborhoods, because of large projected increases in residents and jobs, which would have a deleterious effect on bus travel times. This most directly affects residents who do not have direct access to the T-Third and Central Subway.

Communities of concern are generally underrepresented among the zones with the longest travel times to popular destinations, and vastly more CoC zones see significant travel-time improvement between 2012 and 2040 than do non-CoC zones (see *Figure 22*). This is likely a result of the fact that many CoC zones are either within San Francisco's transit core (and, thus, have fast, easy access to the most popular destinations) or are along the T-Third line.

[14] Source: SF-CHAMP 4.3.

Figure 20: 2012 – Transit Travel Time to Popular Destinations by Zone[15]

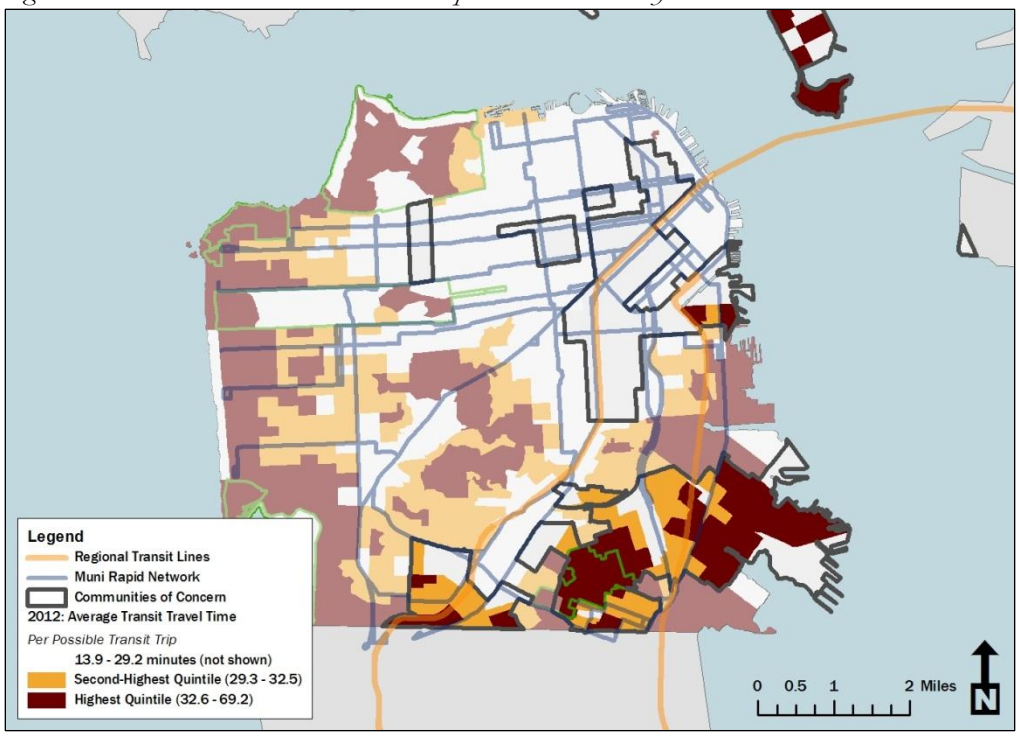
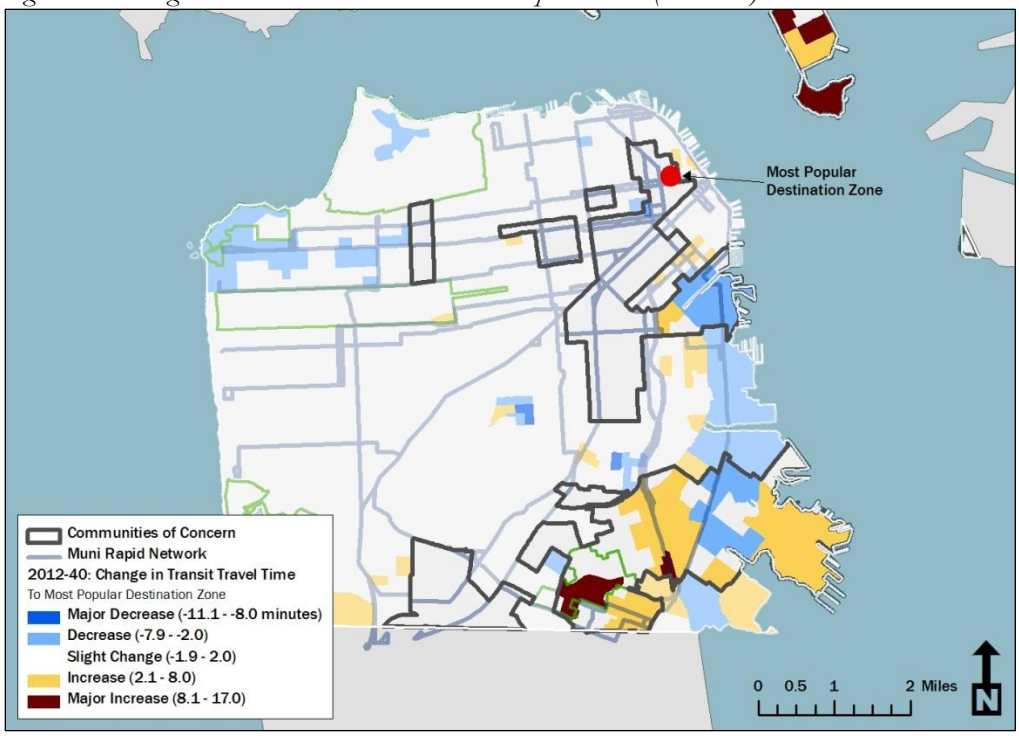


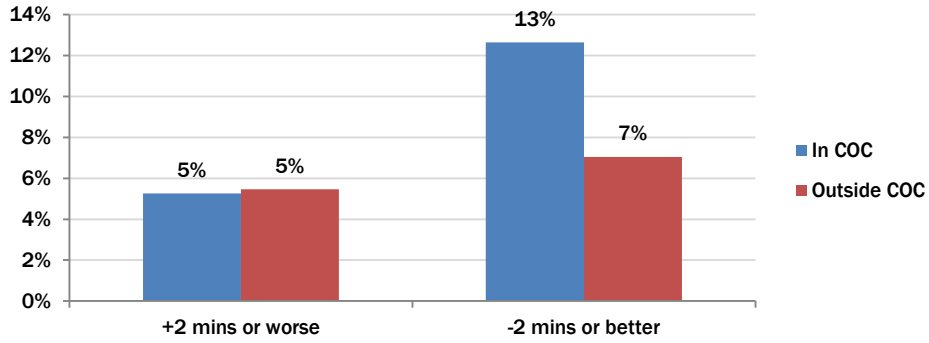
Figure 21: Change in Transit Travel Time to Most Popular Zone (2012-40)[16]



[15] Source: SF-CHAMP 4.3.

[16] Source: SF-CHAMP 4.3.

Figure 22: Change in Travel Time to Popular Destinations by Socioeconomic Status (2012-40)



Vehicle Miles Traveled

The analysis used the SF-CHAMP model to estimate current and future vehicle-miles traveled. VMT can be an indicator of the quality of alternatives to private vehicles as well as the levels of emissions and of wear-and-tear on local roads.

VMT patterns are more strongly geographic, rather than socioeconomic, in nature but the patterns are well correlated with patterns of density and topography. High rates of VMT cluster along the lower-density southern and western edges of the city, while lower rates of VMT cluster in the downtown core (and in zones with no residential development, such as those in the city's major parks and, as of today, little-used former industrial areas like the Hunters Point Naval Shipyard in the Bayshore neighborhood) (See Figure 23). The same basic pattern continues in 2040, though VMT generally goes up across the city (see Figure 24).

The range in density and transit availability among CoCs potentially masks some significant socioeconomic equity concerns evident in the city's lower-density communities of concern. On the whole, communities of concern are overrepresented among both the best and worst quintiles of zones by VMT, but CoCs in the Outer Mission and Bayshore neighborhoods have large clusters of high-VMT zones, while CoCs in the downtown area have large clusters of low-VMT zones.

Figure 23: 2012 – Vehicle Miles Traveled

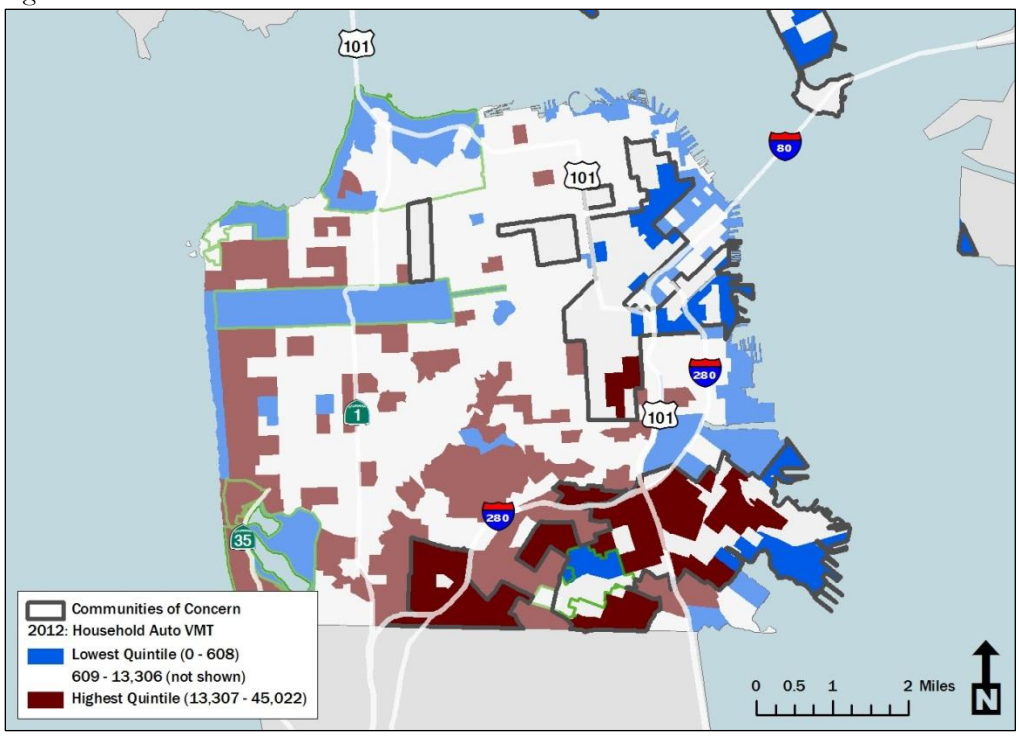
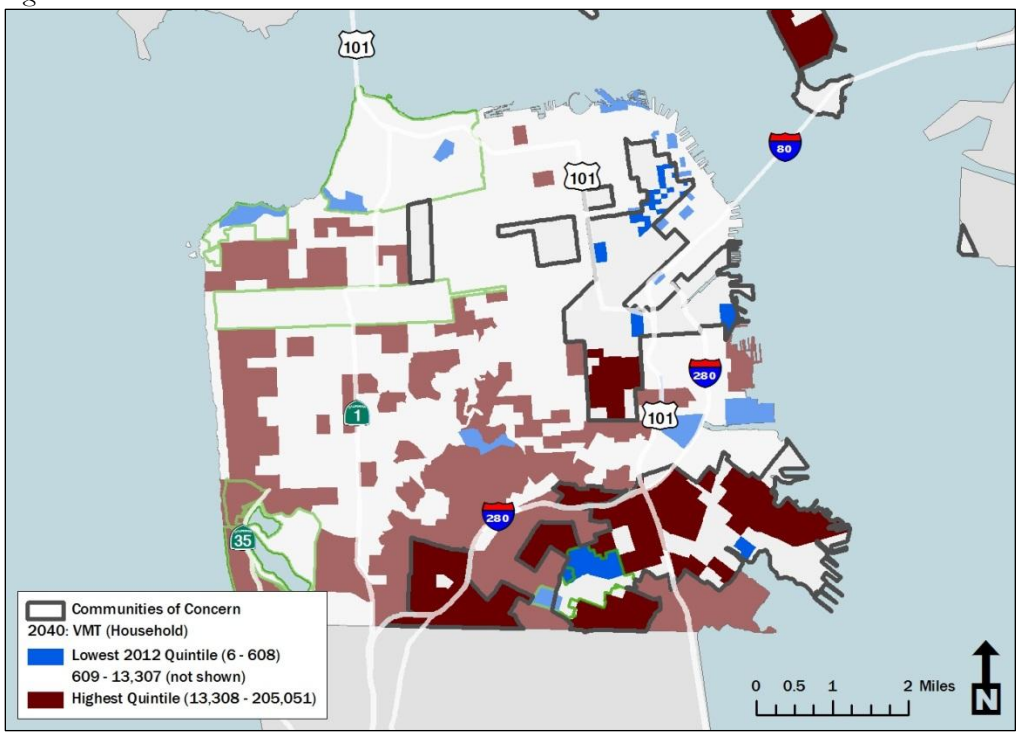


Figure 24: 2040 – Vehicle Miles Traveled



NEIGHBORHOOD TRANSPORTATION PLANS

Neighborhood Transportation Plans (NTPs) are the result of a community-based planning effort to identify high-priority transportation needs and develop conceptual designs for transportation improvements in neighborhoods throughout San Francisco. Each Neighborhood Transportation Plan (NTP) seeks both to address community concerns regarding local transportation conditions and to engage community members in the transportation planning process. NTPs have been developed for several areas of the city, and each plan encompasses some of San Francisco's identified Communities of Concern. These plans are a valuable source of information from the people who live and work in the areas under study, as they can help identify trends in these areas.

The neighborhoods that have already developed NTPs are: Western South of Market, Bay View Hunters Point, Mission/Geneva, and Tenderloin/Little Saigon. The findings of each NTP are summarized in the following section. Because these neighborhoods include communities of concern, the work already completed in this public process can help inform considerations in this equity analysis.

Western South of Market

Pedestrian safety and street crime were among the biggest concerns identified in the Western SoMa NTP. The study identified strong community support for mid-block crossings at alleys and the community's desire to balance pedestrian improvements with parking supply. Community members expressed concerns about vandalism, personal safety, and the need to retain the currently available amount of loading space.

The NTP made several recommendations and developed preliminary designs for signalized mid-block crossings on Minna (at 7th) and Natoma (at 8th), traffic calming measures, landscaping and seating, pedestrian-scale lighting, some modest reductions in on-street parking, the installation of public art highlighting local cultural heritages, and a designed "shared street" on Ringold.

Bayview Hunters Point

Numerous issues that are part of this analysis also came up in the Bayview Hunters Point NTP process. Specifically, community members voiced concerns about pedestrian and bike safety, access to the fastest and most reliable Muni lines, and transit travel times.

The community also identified parking issues (especially cars parking on sidewalks, which affects pedestrian conditions) and obstacles to coordination and resource-sharing as areas of concern.

Community discussions produced a plan to create pilot programs for community-based transportation programs to improve mobility, such as coordinated shuttles and car-sharing. Other areas of need include improved infrastructure to support walking, bicycling, and transit, reversing cuts in transit service, pursuing the possibility of construction a Caltrain station at Oakdale Avenue, and better managing parking to support local businesses and keep cars off sidewalks. Third Street in particular was identified as a place where the walking environment needs to be improved while minimizing effects on transit.

Mission/Geneva

Mission/Geneva community members identified transit reliability, pedestrian safety problems at unsignaled and complex intersections, and narrow sidewalks as concerns, aligning with several parts of this analysis. The plan made recommendations for specific intersections, including a redesign of

the San Juan Avenue/Persia Avenue/Ocean Avenue intersection (the "Persia Triangle"), and made suggestions for bus bulbs, corner curb extensions, and widened sidewalks along Mission.

The study also identified needs specific to the two corridors within the study area (Mission and Geneva). Recommended changes along Mission are meant to improve transit travel times, recognizing that transit delays are caused by double parking and the lack of left turn lanes. The plan's recommendations along Geneva aim at reducing traffic speeds and creating a more comfortable walking environment with landscaped buffers, bus bulbs and corner extensions, and high-visibility crosswalks.

Tenderloin/Little Saigon

The Tenderloin/Little Saigon community outreach process found that pedestrian safety, transit reliability and accessibility for low-income people, traffic speed, security, and the community experience were all concerns they wanted to address in any potential transportation improvements. Most of these issues are explored in this analysis. The discussions produced recommendations for improving existing crosswalks, installing pedestrian countdown signals and corner bulbs, and some traffic calming, as well as improving transit service by creating transit-only lanes, consolidating routes on two-way streets, and installing NextBus at bus stops. Other recommendations include improving bus shelters, reassessing the location of loading zones in relation to bus stops, constructing bus bulbs, adding trees, and repairing sidewalks.

IMPACT ON NEW SAN FRANCISCO TRANSPORTATION PLAN

The equity analysis may inform the SFTP Update in two key ways.

First, equity may be one of several criteria used to determine which projects and programs should be included in the SFTP's financially constrained and vision investment scenarios. Other criteria may include cost-effectiveness, support for Priority Development Areas, and public input. The team could give potential projects and programs credit for improving equity if they address a socioeconomic or geographic disparity identified in this analysis.

The SFTP investment scenarios could also set aside some discretionary revenues for projects and programs that would improve equity issues as identified in this study. Such funds could be programmed to specific projects through the Prop K Five-Year Prioritization Programs (5YPPs).

CONCLUSION

This analysis of the spatial distribution of transportation system conditions reveals some trends in both socioeconomic and geographic equity issues in San Francisco, as well as some geographic trends that may be expected due to topography or density, and unrelated to equity. For safety metrics in particular, the city's communities of concern tend to experience disproportionately worse conditions, experiencing more pedestrian and bike injuries and higher rates of street crime. While communities of concern as a whole do not fare significantly worse than the rest of the city on most other metrics explored in this analysis, poor system performance / condition does cluster geographically in some ways that are not predicted by historic development patterns or the city's hilly topography, in particular: transit speeds, reliability, and crowding. The SFTP investment scenarios could potentially call for direct greater resources to be directed towards these areas.

Appendix G

SFTP POLICY RECOMMENDATIONS

1 Introduction

Development of the SFTP included policy analysis on several topics described in Figure 4 of the SFTP. The analysis resulted in policy recommendations grouped according to five themes:

- Stability in transit operations and maintenance
- Coordinated street delivery
- Community partnerships for trip reduction
- System efficiency projects for all modes
- New project delivery and revenue strategies.

The following sections list all SFTP policy recommendations and associated supporting plan investments. These recommendations include activities that the Transportation Authority could lead in partnership with other agencies, as well as activities in which the Transportation Authority could play a supporting role. Select recommendations are explained in greater detail within the SFTP itself.

2 Stability in Transit Operations and Maintenance

Transit operating costs are unsustainable, yet there is a need for more service. The SFTP prioritizes maintenance funds for Muni vehicle mid-life maintenance, which will increase the number of vehicles available for service and reduce service turnbacks affecting outlying neighborhoods.

2.1 Draft Policy Recommendations

2.1.1 | MUNI & REGIONAL TRANSIT | OPERATIONS

- Pilot improved access to regional transit for the city's west side.
- Work with SFMTA to enable regional operator inbound pickups.
- Help shape the next generation of improvements to Clipper, including improved access to Clipper/Muni discounted fares.
- Seek to identify a regional funding solution to stabilize Caltrain operating and capital funding.

- Pursue Muni cost management strategies, in concert with regional efforts.

2.1.2 | MUNI & REGIONAL TRANSIT | CAPITAL ASSETS

- Prioritize replacement of the Muni vehicle fleet and maintenance funds for Muni vehicle mid-life overhauls to improve reliability and reduce service turn-backs.
- Incorporate information from Muni Capital Asset Management Systems into funding requests to inform prioritization and decision-making.
- Support BART's efforts to secure funding to replace and expand its vehicle fleet.

2.2 Investment recommendations

2.2.1 | SFTP INVESTMENT PLAN

- **MUNI AND REGIONAL TRANSIT. EXISTING AND NEW OPERATIONS AND NEW VEHICLES**. Invest $10M/year toward continued or new transit services.
- **MUNI AND REGIONAL TRANSIT.** Capital Asset Maintenance. Increase investment by $30M/year to fully fund vehicle replacement for all operators, Muni vehicle mid-life overhauls, and 70% of the most critical capital asset needs of all operators.
- **TRANSIT PERFORMANCE INITIATIVE (TPI).** Fund a Long Range Transit Network Development study to identify solutions to Muni Metro system bottlenecks; prioritize solutions that would improve travel time and reliability of the Market Street tunnel operations.

2.2.2 | SFTP INVESTMENT VISION

- **MUNI AND REGIONAL TRANSIT. EXISTING AND NEW OPERATIONS AND NEW VEHICLES**. In addition to the above, provide $40M/year to close the shortfall to provide all today's scheduled Muni service. Additionally, provide over $10M/year for new regional transit operations and vehicles.
- **MUNI AND REGIONAL TRANSIT. CAPITAL ASSET MAINTENANCE.** In addition to fully funding vehicle replacement for all operators and Muni vehicle mid-life overhauls, fund 100% of the most critical capital asset needs of all operators.
- **TRANSIT PERFORMANCE INITIATIVE (TPI).** In addition to the Long Range Transit Network Development Study (above), fund up to $1.5 Billion worth of projects over the Plan period.

3 Coordinated Street Delivery for Better Safety Citywide

The SFTP's equity analysis identified pedestrian and bicycle safety projects as important ways to address socio-economic and geographic disparities in San Francisco's transportation system. The SFTP would support the City's Pedestrian and Bicycle Strategies, as well as better coordination of street maintenance, safety projects, and enhancements in neighborhoods citywide.

3.1 Draft Policy Recommendations

3.1.1 | LOCAL STREETS MAINTENANCE AND DEVELOPMENT / COMPLETE STREETS

- Work with partner agencies to identify and implement near-term (5 year) recommendations based on SFTP Small Project Delivery research.
- Apply a complete streets checklist to street resurfacing funding allocations and require coordination of curb ramp design and construction requests with bulbouts, subject to funding availability.
- Dedicate Prop K funds and revenues to the design and implementation of complete streets enhancements that "Follow the Paving."
- Dedicate Prop K funds to address geographic and socioeconomic equity by helping to strengthen the pipeline of plans and projects, particularly in Communities of Concern.
- Increase transparency and promote public involvement by sharing agency prioritization and development processes (e.g. Citizen's Guide to Transportation Improvements in multiple languages).
- Support development of an Implementation Plan for the Bicycle Strategy, including completion of a bicycle network comfort index to inform prioritization.

3.2 Investment Recommendations

3.2.1 | SFTP INVESTMENT PLAN

- **LOCAL STREET STRUCTURES.** Maintenance. Invest $10M over the Plan period to address unmet needs.
- **LOCAL STREETS AND ROADS MAINTENANCE, SAFETY, AND ENHANCEMENT**. Invest in multimodal (pedestrian, bicycling, traffic calming, signal) projects citywide.
    - Increase investment by $30M/year to maintain today's pavement condition: "fair" (PCI 68).

- Invest $10M/year in pedestrian safety and enhancements, including Safe Routes to Schools and Transit, traffic calming, education, outreach, and enforcement.
- Bicycle network development and implementation.
- Maintain historic levels of investment in transit enhancements and customer-first treatments.

- **NEIGHBORHOOD PLANNING AND PROJECT DEVELOPMENT CITYWIDE.** Invest $5M/year towards increased planning and project development to build neighborhood capacity and a strong pipeline of projects.

3.2.2 | SFTP INVESTMENT VISION

- **LOCAL STREET STRUCTURES**. Maintenance. Invest a total of $20M over the Plan period to address unmet needs.
- **LOCAL STREETS AND ROADS MAINTENANCE, SAFETY, AND ENHANCEMENT**. Invest in multimodal (pedestrian, bicycling, traffic calming, signal) projects citywide.
  - Increase investment to reach and maintain a "good" pavement condition (PCI 70).
  - Fully fund the City's Bicycle and Pedestrian Strategies.
  - Bicycle network development and implementation.
  - Increase funding for local and regional transit enhancements to over $10 Million and $12 Million per year, respectively.
- **NEIGHBORHOOD PLANNING AND PROJECT DEVELOPMENT CITYWIDE.** Invest $10M/year towards increased planning and project development to build neighborhood capacity and a strong pipeline of projects.

4 Community Partnerships for Trip Reduction

The public sector alone can't meet San Francisco's transportation needs. Some needs may be better met by empowering and collaborating with the private sector and communities. The SFTP increases support for cost-effective employer, school and community trip reduction partnerships. These multimodal investments and demand management, including congestion pricing downtown and on Treasure Island, account for half the performance benefits of the SFTP.

4.1 Draft Policy Recommendations

4.1.1 | TRANSPORTATION DEMAND MANAGEMENT (TDM)

- Implement the recommendations of the TDM Partnership Program including the SFMTA Shuttle Partners Program.
- Explore an area-wide parking cap or employer trip reduction programs for SoMa/Mission Bay.
- As Congestion Management Agency, coordinate with Planning Department to review and monitor employer trip reduction/management plans for new developments with significant peak period vehicle trips.
- Support SFMTA's regulatory programs to allow safe integration of 3rd party providers.
- Support development and implementation of the Transportation Sustainability Program.
- Further evaluate potential congestion pricing program for the Northeast Cordon.

4.2 Investment Recommendations

4.2.1 | SFTP INVESTMENT PLAN

- **TRANSPORTATION DEMAND MANAGEMENT.** Increase investment to $2M/year for expanded employer, school, and community trip reduction programs.
    - Mobility management support for Community Based Organizations (CBOs) (e.g. Bayview vehicle-sharing)
    - Bikeshare/carshare initiatives (addresses affordability)
    - Parking management
    - Employer policies
    - Partnerships with Employers /CBOs/ Schools
    - Regulate and coordinate with third party transportation service providers
- **CONGESTION PRICING.** Northeast Cordon and Treasure Island. Seek federal financing for capital start-up costs.

4.2.2 | SFTP INVESTMENT VISION

- **TRANSPORTATION SYSTEM AND DEMAND MANAGEMENT.** Increase investment to over $3.5M/year for expanded employer, school, and community trip reduction programs.

5 System Efficiency Projects for All Modes

Modifications to rail alignment and signals at key Muni Metro intersections can address bottlenecks to improve reliability and travel time. Dedicating a lane on freeways that traverse San Francisco to carpoolers and express buses (HOV lanes) will encourage drivers to make smart transportation choices and will speed up travel.

5.1 Draft Policy Recommendations

5.1.1 | EFFICIENCY AND EXPANSION PROJECTS

- Support coordinated design and delivery of major capital projects, e.g. capacity improvements at the Embarcadero and Montgomery BART stations with the Transbay Transit Center and Better Market Street.
- Coordinate transit investment with SFMTA and with land use development plans with the Planning Department through the Transportation Investment and Growth Strategy.
- Support identification and development of Transit Performance Initiative projects that invest in existing core transit infrastructure to improve reliability, efficiency and travel time.
- Increase partnerships with the region, counties, and Caltrans to identify and promote San Francisco's priorities for the regional freeway network (multimodal corridor management), including FasTrak development and local signals investment strategy.
- Support the Planning Department's update of the General Plan Transportation Element.

5.2 Investment Recommendations

5.2.1 | SFTP INVESTMENT PLAN

EFFICIENCY AND EXPANSION PROJECTS. Invest $1.44B over the Plan period in new projects and studies to raise the operational efficiency of our system and meet the demands of growth. In addition to the Baseline projects, the Plan includes:

- Continue developing the rapid transit network for improved travel time and reliability (e.g., Transit Effectiveness Project (TEP); Bus Rapid Transit (BRT) on Geary, Geneva and Potrero/Bayshore.
- Set a vision for management of the City's freeway management through the Freeway Performance Initiative (FPI).

- Identify the City's long range transit network development priorities for BART, Caltrain, and Muni.

5.2.2 | SFTP INVESTMENT VISION

EFFICIENCY PROJECTS. In addition to the projects listed above, the SF Vision Investment Scenario includes:

- $500M over the Plan period for BART Metro, increasing service capacity and reliability to San Francisco.
- $130M over the Plan period to implement recommendations of the Freeway Performance Initiative (FPI).
- Fully fund the M-line West Side alignment and grade separation.

6 Project Delivery and Revenue Strategies

We should consider a range of approaches to paying for and delivering projects so that we can provide benefits more quickly and extend the reach of existing and new resources. For example, we can streamline project delivery through public private partnerships and design build contracts so that project schedules and budgets can be managed more effectively. The SFTP also includes strategies for seeking new revenues.

6.1 Draft Policy Recommendations

6.1.1 | REVENUE ADVOCACY

- Work with the Mayor's 2030 Transportation Task Force to identify near-term, new, locally-controlled revenues.
- Advocate for top SF priorities and for maximizing SF's share of discretionary federal, state, and regional revenues.
- Advocate for new revenues at the federal, state and regional level that can support transportation capital (especially SOGR) and operating needs.
- Advocate for increased SF share of State Highway Operations (SHOPP)(SOGR) funding.
- Advocate for fair share of state cap-and-trade revenues for transportation; eligible uses should include transit SOGR and operations and cost-effective GHG reduction strategies.
- Support value capture funding strategies in lieu of redevelopment funds.

6.1.2 | PROJECT DELIVERY

- Serve as a resource on project delivery and innovative finance.
- Advocate to maintain and expand project delivery methods including P3 and design-build.

- Seek public private partnerships to help fund construction and maintenance of Better Market Street improvements.
- Work with the City, TJPA, Caltrain, and MTC to solidify the plan for delivering the Caltrain Downtown Extension to the Transbay Transit Center.
- As the Transportation Authority, conduct more performance monitoring (e.g. spatial transit reliability) and evaluation (before/after studies).

6.2 Investment Recommendations

6.2.1 | SFTP INVESTMENT PLAN

Baseline and Expansion Projects. Major capital projects in the Baseline include: Transbay Transit Center/ Caltrain Downtown Extension, Central Subway, Van Ness BRT, Caltrain Electrification, and Presidio Parkway. Discretionary major projects that may be good candidates for innovative funding or delivery include: Better Market Street; the Bi-County Program; the M-Line West Side Alignment and Grade Separation.

6.2.2 | SFTP INVESTMENT VISION

Expansion Projects In addition to the above, implement up to $1.5 billion of the City's long range transit network development priorities for BART, Caltrain, and Muni.

Appendix H: White Paper

SMALL STREETS PROJECT DELIVERY

KEY TOPICS

- Discussion of opportunities to improve the timeliness, transparency, and effectiveness of small transportation project implementation

1 Introduction and Project Purpose

San Francisco agency's processes for identifying, prioritizing, and designing small-scale street improvements (sidewalk bulbouts, crosswalks, bike lanes, traffic calming) is a mystery to the public and a source of frustration to many in city government. The fragmented institutional roles and myriad funding sources in the transportation sector are common explanations for slower-than-desired delivery rates, as are funding related challenges. These conditions exist in other U.S. cities, however, and may not fully explain the situation in San Francisco.

The Project Delivery Strategic Initiative of the San Francisco Transportation Plan (SFTP; see Attachment 1 for list of acronyms) seeks to identify opportunities to improve the timeliness, transparency, and effectiveness of project implementation in San Francisco's transportation sector. This research on small streets projects seeks to document the extent to which key stakeholders and practitioners perceive a problem with the delivery of small street projects, and to document their views about the specific challenges that exist in San Francisco. This research project also made note of stakeholders' input on how best to address these issues.

This research project was intended to provide neutral ground for stakeholders and practitioners to provide comments and as such, this summary doesn't rank or evaluate interviewee responses. They are intended to provide a jumping off point for discussion for agencies to work together to identify steps that can be taken to improve the perception and actual timeliness, transparency, and effectiveness of small scale transportation project implementation.

2 Research Approach

In March 2013, investigator Victoria Eisen (Principal with Eisen|Letunic) conducted 27 interviews, representing 14 agencies and organizations (see Attachment 2 for list of interviewees). Interviewees ranged from members of the San Francisco Board of Supervisors (which also sits as the Transportation Authority governing board), city agencies responsible for planning, programming, designing and/or implementing projects, to civic organizations and other non-government project sponsors. Ms. Eisen asked respondents about their perceptions of project delivery and about the main contributing factors to delays in the context of five categories: Policy, Process, Organizational, Resources and Outside

Regulation. When asked, "small projects" were defined by example, including bulbouts, crosswalks, bike lanes and other spot improvements typically limited to a single intersection or street resurfacing segment. In all, these interviews resulted in over 60 pages of notes, which were then organized into large matrices, categorizing interviewee comments on specific challenges to small project delivery and suggestions for addressing them. A summary of what she heard is presented below.

3 Summary of Findings

A. All persons interviewed stated that San Francisco is challenged in delivering small street projects.

B. Primary challenges mentioned span all five categories of contributing factors:
   1. City lacks strong and clear leadership implementing transportation policies.
   2. City's Complete Streets (CS) policy doesn't include a modal hierarchy.
   3. Final designs based on consensus can diminish ability to reach project goals.
   4. Coordination within and among agencies is inadequate to deliver a multi-modal vision.
   5. Agencies have different transportation priorities and cultures.
   6. Funding and grant administration processes are burdensome and inefficient.
   7. No funding available for pre-implementation or coordination.
   8. City lacks a sufficient pool of experienced, proactive project managers.
   9. Some city staff who interact with the public need public communication training.
   10. CEQA empowers opponents of any project.

C. Main suggestions mentioned span efforts that have already been begun, are just being initiated, and those that respondents would like to see happen, including:
   1. City needs single leader to establish transportation priorities.
   2. Add a street-specific modal hierarchy to city's CS policy.
   3. Create city Department of Transportation (DOT) or Streets Department (separate from Muni), with ultimate responsibility for delivering CS projects.
   4. Create integrated project teams.
   5. Create hierarchy among existing agencies so one is ultimately responsible for delivering CS and others provide support.
   6. Streamline funding and grants management processes.
   7. Create funding pot for CS project conception and coordination.
   8. All PMs should use same CS checklist (see Seattle) and attend a unified PM training program.
   9. Provide public communications training to staff who will interact with the public.
   10. Implement proposed CEQA reforms.

The attached five tables summarize the specific challenges to project delivery mentioned by interviewees and identify their specific suggestions for addressing them. As noted above, interviewee comments have been summarized in the tables below, but have not been ranked or evaluated since this research is intended to inform future discussions about next steps for improving small project delivery in San Francisco.

4 Policy

	CHALLENGES		INTERVIEWEE SUGGESTIONS
1.	City lacks strong and clear leadership in implementing transportation policies (e.g., Transit First policy) • Without leadership no one agency wants to give up control over project implementation • No high-level institutional champions for coordinating (as Better Streets Plan had)	a) b)	City needs single leader to establish transportation priorities across departments. City needs overarching pedestrian safety policy to guide all agencies.* • E.g., prioritization methodology
2.	City's CS policy doesn't include a modal hierarchy • City bad at weighing tradeoffs • City still fighting about what streets should be used for • No citywide trans-departmental vision • BSP doesn't say on which corridors which modes trump	a)	CS policy needs a street-specific modal hierarchy • E.g. NYC DOT guidance • In General Plan Transportation Element
3.	Agencies' priorities are sometimes inconsistent with one another	a)	Includes policy, process and organizational solutions.
4.	Plans have no clear implementation mechanism • E.g., Pedestrian Action Strategy	a) b)	Develop TEP for walking.* Ped strategy needs metrics and deadlines like ADA Transition Plan & city PCI policy • E.g., Ped Action Strategy calls for fixing ~5 mi/yr of roads with high ped collisions over 10 years
5.	Past charter amendments constrain future flexibility.	a)	Role of Charter should be to establish departments & commissions, but should be vague about specific responsibilities of each • Remove prescriptions from Charter because priorities change. • Facilitate needed Charter changes through ordinance.

* Initiative underway

5 Process

CHALLENGES	INTERVIEWEE SUGGESTIONS
1. Final designs based on consensus can diminish ability to reach project goals • E.g. TASC • Need for 100% consensus reduces opportunities for innovation • Agencies can veto a project by stonewalling/ignoring it • Innovative projects can suffer death by 1,000 cuts	a) Street Design Review Committee* – if conflicts between agencies, Committee will rule in favor of city policy • Controller's Report recommendation & legislation introduced by Supervisor Wiener* • Reports to Mayor & incl reps from all agencies • Anyone can request that a project be reviewed • Eventually would replace TASC
2. Coordination within and among agencies is inadequate to deliver a multi-modal vision • Streets Capital Group – members don't have authority to approve projects; run by PLN, which is not an implementing agency, so implementing agencies don't feel ownership of process • Reluctance on part of PMs to coordinate across departments / agencies (because perceived as slowing down projects) or add scope onto projects to point that scale will trigger TASC or public process. • No setting for considering surface and subsurface infrastructure at the same time • MTA staff doesn't typically do constructability analyses. • DPW repaves roadways, but MTA does striping, which sometimes leads to 60-90-day delay between the two tasks. • MTA review by one department doesn't reflect needs of all MTA departments. • See POLICY challenge #4.	a) Create integrated project teams • Consider putting MTA (Sustainable Streets), DPW & PLN in same bldg • Eliminate barrier of travel time between bldgs • Easier than ballot initiative or charter amend • Include centralized outreach (see PROCESS suggestion 5d) • Jointly designate or hire pool of PMs to deliver program of high-priority projects, where coordination is essential. b) All PMs should use same CS checklist* (see Seattle) and attend a unified PM training program. c) Establish policies on surface/subsurface infrastructure • PLN should coordinate with PUC on Green Connections Plan re: subsurface utilities • PUC should use subdivision guidelines as an opportunity to do this. • Joint PUC/TA presentation to TA Board since both agencies have funding for long range planning/priority-setting • Follow successful examples of surface / subsurface coordination, e.g., PUC Green Infrastructure d) Institutionalize coordination through Envista* • Broaden "Follow the Paving" efforts beyond bond projects* • DPW needs to anticipate and initiate opportunities to coordinate to implement CS components • Keep Envista's planning module updated (TA to fund this effort?) • Use common set of tools to track Envista 5-yr paving program, MTA 5-yr Cap. Plan, Prop K 5YPPs e) DPW should conduct constructability review before resources are spent on project design. f) Single agency should repave and restripe. g) Create a "Jump Start" funding pot to facilitate CS add-ons to projects (see RESOURCES 2a)
3. Project development and delivery processes unclear • Lack of clarity on process of reviewing, approving, delivering projects on part of public, elected officials & other agencies • 5-yr paving program drives implementation of CS features due to BSP 5-yr paving moratorium, yet it's not subject to public process.	a) Publish Citizens' Guide to Transportation Planning, with each implementing agency writing its own section to describe how ideas become on-the-ground projects.
4. City ignores own plans, policies, standards • E.g., Transit First, Complete Streets, neighborhood plans • "Next steps" sections of plans typically lack detail with varying buy-in of implementing agencies. • Under current conditions, city has more projects	a) City needs single leader on transportation to demand compliance, quality designs (see POLICY suggestion 1a) b) Plans need more detailed "Next Steps" and agreed timelines to implementation, e.g. see Bi County Transportation Study Table 19. pp.76

identified in completed plans than can be implemented in next 20+ years.	
5. Public process is too time-consuming and inadequate • Too much time between public meetings and construction • Unwillingness of staff at public meetings to disappoint public with realistic constraints	a) Reduce number of meetings per project b) Deliver quickly as results get stale c) Move/add meetings closer to implementation d) Centralize outreach role using citywide professionals (like BART model) e) Develop outreach guidelines or toolkit for PMs.

* Initiative underway

6 Organizational

CHALLENGES	INTERVIEWEE SUGGESTIONS
1. Multiple agencies involved in transportation gives rise to varying practices and priorities, creates confusion for the public. • Agencies led by separate boards with sometimes dissimilar priorities. – "PCI is more important to DPW than number of people killed." – "MTA is too focused on Muni, moving traffic, parking and LOS and not focused enough on pedestrian safety." – "Since DPW reports to the Mayor and not the BOS, the SFTP is not compelling to them." – "Multiple capital plans is confusing to the public, agencies and decision-makers." • Agencies have different cultures. – "MTA often lacks sufficient internal coordination between and among divisions." – "Although PUC (and private utilities) are responsible for all that lies below transportation projects, they're not typically involved in project pre-planning, nor do they always consider above-ground impacts of their projects." – "PLN understands the value of Traffic Calming/CS better than many implementing agencies." – "TA does not have implementing responsibilities, so is not sensitive to challenges."	<u>Main Organizational Suggestions</u> a) Keep organizational structure as is and focus reform on *Process* recommendations b) Create hierarchy among existing agencies • MTA Sustainable Streets or DPW would be transportation hub of city • Other agencies/organizations would play specific supporting roles c) Create new city DOT or Streets Dept • New York City DOT model, where staff includes planners, designers and construction <u>Other Organizational Suggestions</u> d) Transit operations should remain its own agency. e) Put sewer & water delivery under DPW so easier to consider roadwork (like Palo Alto model) f) City (DPW) should accept responsibility for maintaining streets currently managed by Rec/Park, Port & Presidio g) Need strong, *empowered* PMs (see RESOURCES, suggestion #6) h) Better integrate DPH injury prevention team and SFMTA. i) Move Street Lighting Bureau from PUC to DPW or new Streets Dept.
2. MTA cannot focus on traffic calming until transit house is in order.	a) Create funding plan for implementation of TEP
3. Which agency to contact is confusing for non-governmental project sponsors.	a) City should have single point of contact for non-governmental agencies working to construct projects.

7 Resources

	Challenges		Interviewee suggestions
	FUNDING-RELATED		
1.	Funding and grant administration processes are burdensome and inefficient. • Easier to use federal funds (FHWA, FTA) than Prop K • Separating allocations by phase is not perceived to improve project quality. • PMs and grants managers not always coordinated • Caltrans/FHWA grants require sponsors and PMs to be diligent and aware of grant expiration deadlines and other requirements, e.g., HSIP. • Grant admin costs can exceed grant amount for a given phase of smaller projects. • Work stops while grant recipients are waiting for phase-specific approval (TA CAC, TA Plans and Programs, TA Board process takes 9 weeks). • MTA can't open job # until after TA allocation (thereafter, process takes up to 2 months).	a) b) c) d)	With grantees, TA should develop and pilot a streamlined Prop K funding process for smaller projects, and monitor and report on resulting project delivery outcomes (e.g., create two Prop K allocations per year: conceptual engineering and constructability review for prioritized projects; and completion of design and construction) TA should fund multi-phase projects through one allocation if they are sufficiently developed and reflect input from multiple agencies. (New MTA traffic calming program may provide opportunity to combine allocations.) Grant recipients should train PMs on timely use of funds deadlines and other federal grant requirements. Better align the accounting teams of Planning, DPW, TA and the Controller's Office.
2.	Inadequate funding available for pre-implementation and coordination. • E.g., conceptual planning, 30% design, environmental analysis • Implementation departments are project funded.	a)	Create funding pot for planning, project development, conceptual design & environmental analysis. • Fund through Prop K 5YPP process, which allows this use of funds for capital project development. • Applicants would be integrated in cross-departmental teams (see PROCESS suggestion 2a)
3.	Life-cycle costs, including maintenance and operations, not always considered during project design.	a)	Consider O&M costs when designing projects.
4.	Enterprise departments cannot access general funds, yet politically, most cannot raise fees at will.	a) b)	Allow MTA greater access to the General Fund. Mayor's Transportation Task Force and SFTP are considering new revenues for transportation.*
5.	Difficult for neighborhoods with few development opportunities to undertake area transportation plans because there is little hope of obtaining impact fees to implement projects.	a) b) c)	Fund neighborhood plans in built areas w/General Fund. Prop K should provide funding to support neighborhood transportation plans, especially those without opportunities for large development projects. Prop K should directly fund streetscape improvements in these neighborhoods.
	STAFF-RELATED		
6.	City lacks a sufficient pool of experienced, proactive PMs. • Need to know coordination process, decision-points • Need to have communication & facilitation skills • Can be consultant (e.g., UC Hastings successfully utilized contract PM with city familiarity in parking garage project)	a) b) c) d) e)	Jointly designate and hire pool of PMs to deliver program of high-priority projects, where coordination is essential. Create integrated project teams (see PROCESS 2a) All PMs for CS projects should use the same checklist* (see Seattle) and attend a unified PM training program. Use citywide pool of consultants. Remove disincentives for PMs to add Complete Street features, (e.g. provide design toolkits, funding pots)
7.	Some city staff who interact with the public need public communication training.	a) b) c)	Train staff who will interact with the public to: • Communicate clear goals and objectives from city policy • Work with community push back • Improve listening skills • Discuss project trade-offs Would save time if public were told what can and cannot happen at outset of planning process. MTA Livable Streets: just hired Public Information Officer to respond to inquiries.*

8.	Most city agencies under-utilize consultants to design, manage and deliver small projects.	a) Consider using consultants to help with some project development/ delivery tasks b) Utilize on-call consultant contracts to minimize time to procure consultants for a given project. c) Streamline city contracting process

* Initiative underway

8 Outside Regulation

	CHALLENGES	INTERVIEWEE SUGGESTIONS
1.	Federal funds • NEPA requirement can delay projects or risk losing funds • Projects that don't maintain schedule can also lose funding • Consultants' contracts need to conform to federal standards • Difficult to change scope/add features	a) Proactively identify good candidates for federal funds in the early stages of project development. b) Create backlog of fall-back projects so federal funding isn't lost when a funded project can't meet federal deadlines or requirements.
2.	Cal-OSHA requires de-electrification of catenary wires during construction beneath them, which triggers need for diesel replacement/overtime, which increases project cost significantly	
3.	"CEQA empowers opponents of any project"	a) Implement proposed CEQA reforms.

9 Appendix

9.1 | List of Interviewees

AGENCY	INTERVIEWEE
City Administrator's Office	Brian Strong
Controller's Office	Chava Kronenberg
Controller's Office	Christina Lee
DPW	Ramon Kong
DPW	Douglas Legg
DPW	Cristina Olea
Livable City	Tom Radulovich
SFMTA	Matt Brill
SFMTA	Damon Curtis
SFMTA	Darton Ito
SFMTA	Jonathan Rewers
SFMTA	Seleta Reynolds
SFMTA	Manito Velasco
Planning	Adam Varat
Public Utilities Commission	Rachel Kraai
Recreation & Parks	Karen Mauney-Brodek
SFCTA	Commissioner Avalos
SFCTA	Commissioner Chiu
SFCTA	Commissioner Wiener
SFCTA	Sunny Angulo (Comm. Kim's office)
SFCTA	Andres Power (Comm. Wiener's office)
SFCTA	Rachel Hiatt
SFCTA	Ben Stupka
San Francisco Bicycle Coalition (SFBC)	Kit Hodge
San Francisco Planning & Urban Research (SPUR)	Gabriel Metcalf
University of California, Hastings College of Law	David Seward
Walk SF	Elizabeth Stampe

9.2 | Acronyms

ACRONYM	FULL TITLE
5YPP	5-Year Prioritization Programs
ADA	Americans with Disabilities Act
BSP	Better Streets Plan
CEQA	California Environmental Quality Act
CAC	Citizen's Advisory Committee (of Transportation Authority)
CS	Complete Streets
DOT	Department of Transportation
DPH	Department of Public Health
DPW	Department of Public Works
Envista	DPW's new project-tracking software program
FHWA	Federal Highway Administration
FTA	Federal Transit Administration
HSIP	Highway Safety Improvement Program
MTA	Municipal Transportation Agency (or SFMTA)
NEPA	National Environmental Policy Act
O&M	Operations & Maintenance
OSHA	Occupational Safety & Health Administration
PCI	Pavement Condition Index
PDA	Priority Development Area
PLN	Planning Department
PM	Project Management or Project Manager
PUC	Public Utilities Commission
SFTP	San Francisco Transportation Plan
TASC	Transportation Advisory Staff Committee
TA	Transportation Authority (or SFMTA)
TC	Traffic Calming
TEP	Transit Effectiveness Project

Appendix I: White Paper

MAJOR PROJECT DELIVERY

KEY TOPICS

- Case studies of large project delivery strategies employed in other jurisdictions
- Summary of project delivery success factors

1 Introduction

Background research for the SFTP identified the need to expand the city's capacity to deliver major infrastructure projects, including through alternative and innovative methods. Funding for large infrastructure projects is limited, and self-help strategies will need to continue to be pursued, including user fees and taxes, value capture mechanisms, and Public-Private Partnership (PPP) strategies, if the city is to meet its ambitious goals and growth plans. This report was developed to investigate strategies to improve project delivery and identify innovative delivery strategies.

San Francisco has had some success in delivering high-profile, complex projects. While some project timelines have been lengthy, many are distinguished by innovative funding, design, or institutional arrangements. Such projects include the Embarcadero Boulevard, Central Freeway/Octavia Boulevard, and Presidio Parkway Project. Other major investments are anticipated in the coming period, such as the Transbay Terminal/Downtown Extension of Caltrain, Van Ness and Geary Bus Rapid Transit projects, the Better Market Street project, Muni Metro M-line west side alignment and grade separation, BART and Muni Metro enhancements, and ultimately blended Caltrain/High-Speed Rail. To meet the city's goals and growth plans, it is likely that another generation of robust light and heavy rail investments will be required. This investment program demands a robust funding and project implementation strategy in order to be realized.

1.1 | Purpose of Analysis

This Major Project Delivery research project involved two fact-sheet style case studies of regional agencies that have mounted major project delivery efforts at the program level in response to local goals or mandates. Cases were selected based an initial survey of online sources and recommendations from interviews of key informants knowledgeable of successful innovative programs. Of particular interest were the funding, institutional, policy, political, and contractual arrangements that were marshaled for those efforts. Based on existing data available online and in agency reports, the study summarizes already published facts, analyses or opinions about the projects that were or will be delivered and the overall program, in terms of their perceived benefits and impacts; estimated versus actual costs; institutional transparency and accountability; timeliness of delivery and overall public opinion. This work was supplemented by interviews with practitioners or stakeholders who were involved with, or knowledgeable about, these efforts.

The study aims to identify different models for delivering large transportation projects and document, in a limited way, the local situation and context in which it came about, what results were observed, and

the opinions of interviewees knowledgeable about the projects and programs. With this information, the study produces a set of findings.

1.2 | Research Approach

In order to understand the institutional and political context in which various programs were situated, the study began by examining the structure of public entities involved in transportation infrastructure from funding, through delivery, all the way to operations and maintenance. The information gathered is summarized in Table 1.

Subsequently, a close examination of the history and features of sales tax measures in the largest California metropolitan regions was undertaken, recognizing these measures' importance in funding transportation in California and consequently their strong influence on project delivery, selection, and maintenance. The results of this examination are summarized in Tables 2-5. Counties located in large metropolitan regions, regardless of amount of annual revenues, whose most recently passed transportation sales tax measures contain a programmatic fund allocation for transit operations are also described in Table 6 to provide further context. These findings afford a better understanding of transportation funding and delivery in the state and informed the selection process of in-depth case studies.

Following this, a number of experts in the field of transportation funding, finance, and project delivery in the California context were contacted and interviewed. These interviews permitted the development of an understanding of past and present trends in the field, as well as helped to further focus efforts on a small number of metropolitan regions and agencies. Information gathered in these interviews was also ultimately incorporated into the case studies.

As a result of this research and the industry expert interviews, the San Diego and Los Angeles metropolitan areas were selected for closer examination, based on transportation capital program and region size; program nature and types of projects; and apparent presence of innovative practices.

The case studies that follow explore the two areas by concentrating on the sales tax administrators in each. They integrate information from interviews with industry experts external to transportation agencies, interviews with agency staff themselves, and research based on available reports and documents.

2 Observed Strategies

The application of innovative project delivery, funding, and financing practices to major transportation infrastructure projects represents both a response to current political and fiscal environments, as well as the ongoing pursuit of greater efficiency in delivering transportation projects. San Diego and Los Angeles represent a fast-growing, medium-sized metropolitan area and the third-largest metropolitan area in the country, respectively, and both are known for their car-oriented transportation culture.

To address increasing need and demand for new transit infrastructure, creative congestion management solutions, and rehabilitation of existing facilities, both have pursued innovative methods to get projects on the ground more quickly and economically. Four broad strategies were identified in the course of this study: non-traditional contractual arrangements; innovating funding and financing practices; stakeholder coordination methods; and accountability and oversight measures.

3 Case Study: San Diego

MANY RESPONSIBILITIES: Institutionally, SANDAG plays many roles for a medium-sized region: MPO, CMA, sales tax authority and Express Lane operator, as well as toll road operator as of July 29, 2011. It is also tasked with managing and delivering highway and transit projects in the San Diego region, but is neither a highway nor transit operator.

STRONG ON HIGHWAYS: SANDAG has traditionally been successful at expediting and working with Caltrans to deliver highway projects. This is partially a function of their close relationship and amount of institutional overlap with the California Department of Transportation (Caltrans) District 11; the two often act as an integrated project team, and one interviewee reported that many SANDAG staff are former Caltrans District 11 staff. Though SANDAG does not deliver highway projects, they control a large proportion of the funding for the projects in the region and have significant influence over project development and selection; one interviewee suggested that SANDAG functioned as a board that evaluates and influences projects. In the case of the recent I-5 Managed Lanes project, for example, SANDAG made many of the decisions related to the alternatives analysis, despite Caltrans being the lead agency.

NEW TO TRANSIT DELIVERY: SANDAG received the responsibility of delivering transit projects with the passage of SB 1703 (2003); the Metropolitan Transit Development Board and the North San Diego County Transit Development Board were consolidated into SANDAG as a result. This change occurred around the time of the arrival of Gary Gallegos as the Executive Director of SANDAG. One interviewee suggested that this shift was in part owing to stakeholders' confidence in his leadership.

The consolidation was a move to strengthen regional planning as well as better promote transit and land use integration, since SANDAG, as the metropolitan planning organization (MPO) and Congestion Management Agency (CMA), has some influence over the latter. An interviewee cited the weaker link between design of long-term capital projects and needs of daily operations as a result of the separation of project delivery and operating responsibilities as a downside to this institutional arrangement.

SMALL FULL-TIME STAFF: SANDAG has decided upon a practice of retaining long-term on-call consultants and foregoing the maintenance of a large staff; in this arrangement, they limit in-house activities to community outreach and technical coordination. Staff members often play the role of high-level project or program managers. The scale of these contracts can be as large as $26M spent on a task order to on-call contractors for engineering and planning activities; these contracts may have up to 15 to 20 sub-contractors each.

3.1 | Contractual Arrangements

SANDAG has been intimately involved in a number of projects that have employed non-standard contractual arrangements, though they have not had extensive experience with letting contracts themselves in these situations. Design sequencing, construction-management/general contractor, and design-build arrangements (listed in order of decreasing direct owner control) have all been used on projects at Caltrans District 11 over which SANDAG has had significant input and control. More recently, SANDAG has begun looking to adopt these methods for projects they will lead and deliver directly.

DESIGN SEQUENCING: Design sequencing has been used successfully in the San Diego region, including with the I-15 Express Lanes project. Though SANDAG was intimately involved in the delivery of these projects, the contracts were let by Caltrans; design-sequencing enabling legislation, AB 405 (1999), only permitted Caltrans to pursue such delivery models. This legislation defines design sequencing as "a method of contracting that enables the sequencing of design activities to permit each construction phase to commence when design for that phase is complete, instead of requiring design for the entire project to be completed before commencing construction," with a minimum initial design requirement of 30%.

Design-sequencing can also be used to begin construction before the finalization of complicated but non-critical elements or the completion of right-of-way acquisition. The same interviewee suggested that this method could save up to 12 months due to the overlapping of the final design process and actual construction activities.

In the case of these projects, said one interviewee, design was completed to an average of 70% before allowing contractors to bid. While Caltrans and SANDAG also hoped that contractors would have input in the final 30% of design, due to contractual structures that rendered the incorporation of a contractor's design input difficult because of change-order requirements or a cost reduction incentive proposal (CRIP), the desired level of contractor input and resulting innovation or cost savings in the design process was not realized.

DESIGN-BUILD (DB): SANDAG has experimented with Design-Build on a small scale. Under the Design-Build delivery method, the agency contracts with a single designer-builder, often a construction manager, who self-performs or directly contracts for all design and construction work; the purported benefits of the system are both time and cost savings. Cost efficiencies can be realized through the accountability of the designer to the construction contractor: the construction contractor works with the designer in an iterative process to ensure that the final design is affordable and easy to build. Additionally, time savings can be achieved through more holistic project and resource management, as well as the ability to overlap different project phase activities more easily.

Examples of SANDAG's experimentation with this method are a series of park-and-ride parking garages for bus rapid transit (BRT) facilities as part of the I-15 Corridor Express Lanes project. An interviewee stated that, though the projects did not experience drastic cost escalation or delays, SANDAG did not feel that this approach realized the expected level of time- and cost-savings that would justify further pursuit of DB in the immediate future.

CONSTRUCTION MANAGEMENT/GENERAL CONTRACTOR (CMGC): In 2012, SB 1549 was passed to allow SANDAG to work in CMGC arrangements for transit projects; the same year, AB 2498 (2012) was passed, which established a CMGC pilot program for Caltrans. One interviewee noted that CMGC is perceived as a successor to or augmented version of the design-sequencing technique at SANDAG and Caltrans District 11.

In this method, as defined by the legislation, a contractor is brought into the design process and works with an agency-hired consultant or staff doing the design; the design is completed to at minimum 30% and then the involved contractor has the opportunity to bid on the project. If the agency finds the bid unsatisfactory, the project can then be open to other bidders.

CMGC is similar to Design-Build, but the contractor does not hire the designer or perform the design him or herself. As a result, the contracting agency retains more control over the design process and also maintains ownership of the final plans.

In previous experience with design sequencing, little interaction between designers and builders existed; its principal benefit was achieved by overlapping the two processes temporally to realize time savings. The hope for CMGC is to engage contractors on complex projects (such as I-5 or the Mid-Coast Corridor trolley) early in the process to receive input and benefit from innovative design or engineering methods.

> ***MID-COAST LIGHT RAIL PROJECT:*** This project, which is partially funded by the federal New Starts Program and will connect University City and UCSD to downtown San Diego, will be SANDAG's first major opportunity to deliver a large-scale transit project. The delivery method chosen will be partly Design-Bid-Build (DBB) for the portion that requires extensive third-party coordination and partly CMGC on the more straightforward portion of the project. The breakdown of contracting types represents a desire of SANDAG's to maintain more control over the project delivery process for more complex project components, which DBB affords.

3.2 | Stakeholder Coordination

Coordination of the various actors in project delivery was cited by more than one interviewee as one of SANDAG's strengths. This fact is in part attributable to their close relationship with Caltrans, but extends beyond the integration of the two agencies. SANDAG has given particular attention to the organization and management of large-scale projects or clusters of projects, which has streamlined processes and partially protected them from delays. Sensitivity to environmental concerns through incorporation of dedicated environmental consultant resources has additionally mitigated the impacts of environmental factors on project delivery.

CORRIDOR PROJECTS: A strong emphasis has been put on corridor projects, in part motivated by the requirements to received funds from the Corridor Mobility Improvement Account (CMIA) established in 2006 by Proposition 1B. One interviewee noted that the project teams, which include members from multiple agencies and consulting firms that result from these corridor projects, allow SANDAG to involve the most knowledgeable and skilled individuals, regardless of affiliation.

> ***I-15 CORRIDOR:*** This project included managed lanes and bypass ramps to facilitate access for both High-Occupancy Vehicles and planned Bus Rapid Transit. The lanes themselves were constructed in three segments, with the final segment opening January 17, 2012, a year early and under budget. The construction of BRT-related facilities such as transit centers with parking structures is ongoing and projected to finish construction by 2016. This project in particular has provided SANDAG the opportunity to develop and hone approaches to corridor projects which it plans to carry into the future.
>
> ***NORTH COAST CORRIDOR:*** SANDAG is also managing a large, $6.4B programmatic, packaged effort which entails environmental mitigations and upgrading road, rail, and bike-pedestrian facilities along the northern section of I-5. A subproject within this is a bundle of upgrades to the LOSSAN Corridor, which involves 20 different rail projects, including double-tracking and adding stations to commuter rail facilities in the corridor; none of these are major infrastructure projects like the Mid-Coast Light Rail project, however.

According to interviewees, the corridor model has had a positive, synergistic effect on the quality and thoughtfulness of the delivered projects, and has also inspired Caltrans District 11, through its involvement, to consider other projects differently. Through Caltrans District 11's close relationship with SANDAG, the two have been able to build an understanding of one another's goals. Their

relationship has been less adversarial as a result; Caltrans understands and supports SANDAG's vision of projects as regional products designed to enrich the region holistically, rather than as mere highway construction projects. The North Coast Corridor is an example of this: more than one interviewee observed that there has not been significant opposition on the part of Caltrans to include other, non-highway aspects of the program.

In the context of the North Coast Corridor, SANDAG is pursuing a Construction Manager General Contractor (CMGC) project delivery model for many of the projects in order to speed delivery and manage construction costs, while still retaining ownership of final designs.

ENVIRONMENTAL INVOLVEMENT: The North Coast Corridor, I-15 Corridor, and SR-76 projects have all involved the incorporation of the environmental concerns in the delivery process, going as far as having a full-time staff member for the most recent program, the North Coast Corridor. Funding and impetus for this largely comes from the inclusion of an $850M environmental mitigation program in the new Transnet transportation sales tax ordinance.

This programmatic environmental approach to mitigation spans multiple projects and phases and, according to more than one interviewee, has reduced surprises and increased acceptance of projects, particularly in a region where there are many environmental concerns with regard to development activities. Such an approach has also served to partially transform these transportation projects into environmental enhancement projects, which has further increased engagement.

3.3 | Accountability and Oversight

SANDAG has pursued a number of methods to ensure accountability to the public and its stakeholders. It has additionally established oversight systems for project delivery that attempt to identify and manage potential issues; self-monitoring and provision of information in a transparent way have been the most vital components to reach these goals.

PUBLIC INFORMATION: SANDAG, in conjunction with Caltrans and the help of consulting firms PBS&J and HNTB, launched the Transnet Dashboard in August 2006, which provides interactive information about up-to-date schedule, budget, and expenditure information for Transnet Early Action Program projects. General information is provided in a legible way with graphics, while more specific, specialized project information is also available in text and table formats. This tool is part of a larger website called 'Keep San Diego Moving,' which provides organized, easily accessible information about Early Action Program projects.

> ***EARLY ACTION PROGRAM:*** This program was established by the second Transnet ordinance, which specified that a bundle of the total projects slated for delivery from the sales tax would be delivered within a 10-year timeframe. These projects include both highway and transit. Every 4 years, the transportation plan is updated; with each update, SANDAG continues to prioritize the Early Action Program projects. Establishment of a bundle of projects with a set timeline has led to greater voter buy-in and has created a manageable package that provides SANDAG with focus, goals, and deadlines for which it is accountable.

OVERSIGHT: Oversight requirements outlined in the Transnet ordinance provide for the creation of an Independent Taxpayers' Oversight Committee (ITOC), as well as a system of three audit or review cycles (annual, triennial, and decennial), the former two being the responsibility of the Transnet ITOC.

The ITOC's stated tasks are to enhance accountability for the Transnet Expenditure Plan; ensure the completion of voter mandates; and develop recommendations for the improvement of financial integrity and performance of SANDAG's project delivery practices. Each of the seven members of the ITOC represents a different area of expertise in the field and is selected by a committee composed of San-Diego-region city mayors and county supervisors. Specific responsibilities of the ITOC include contracting an annual audit of all Transnet-funded activities for requirement compliance and preparing a report for the SANDAG Board of Directors summarizing this; conducting a triennial performance audit of SANDAG and other agencies involved in Transnet-funded programs to review project delivery, cost control, schedule adherence, and related activities complete with recommendations; and providing review and comment for various reports and actions undertaken by SANDAG.

In addition to the two audits performed by the ITOC, a comprehensive ten-year review of all projects and programs implemented under the Expenditure Plan in the previous ten years is mandated in order to evaluate the potential need for revision of the Expenditure Plan to improve performance. The robustness of this oversight and auditing system provides ongoing opportunities for comprehensive evaluation of project success and risk factors.

4 Case Study: Los Angeles

ALL UNDER ONE ROOF: The Los Angeles County Metropolitan Transportation Authority (LACMTA or 'LA Metro') was formed in 1993 by the merger of the Los Angeles County Transportation Commission (LACTC) and the Southern California Rapid Transit District (SCRTD). As such, LA Metro is a number of things for Los Angeles County: Congestion Management Agency (CMA), Regional Transportation Planning Agency (RTPA), sales tax authority, and transit owner/operator.

A STRONG AGENCY: LA Metro is a strong player in the region when compared to other levels of transportation planning and governance, such as the Southern California Association of Governments (SCAG), which is the Metropolitan Planning Organization (MPO) for the greater Los Angeles area. One interviewee stated, for example, that LA Metro selects projects and programs with little input from SCAG, though the individual indicated that this may be slowly changing as a result of a change in leadership at SCAG.

VAST REACH: Los Angeles County, over which LA Metro has jurisdiction, contains 88 incorporated cities and holds about 10 million of the region's 18 million people (55%).

TRANSIT DELIVERY, NOT HIGHWAY DELIVERY: LA Metro delivers most transit projects in the region, but relies on Caltrans or local governments to deliver highway and roads projects. There are key exceptions to this, including the three highway projects planned as public-private partnerships (PPP), trial congestion-priced tolled facilities along the I-10 and I-110, and the improvements to I-405 in the Sepulveda Pass.

4.1 | Contractual Arrangements

DESIGN-BUILD (DB): Metro has extensive experience with DB, particularly on maintenance facility and transit projects, to the extent that DB is their preferred method. According to one interviewee, LA Metro has determined that DB is most successful when individuals involved have previous experience with such a method, as well as with the type of project itself, since part of DB's success is related to a

well-designed and specific contract which measures performance and sets good milestones. An example of LA Metro's recognition of this fact is the project delivery structure of the Eastside Gold Line extension: though most was delivered under a DB model, they chose to construct the tunnel with a more traditional Design-Bid-Build (DBB) method due to a lack of certainty or recent experience with tunneling; the interviewee indicated that LA Metro now feels more comfortable about using design-build to deliver a tunnel project.

While DB is the preferred method due to the time savings realized by overlapping design and construction, which one interviewee estimated to be around 8 to 10 months on average for transit projects, each project is assessed to establish the best project delivery method: an evaluation process is undertaken and the results are taken to the LA Metro Board of Supervisors to make a recommendation. The interviewee also indicated that outside consultants are brought in when such a determination can be difficult for LA Metro to make alone.

> ***I-405 HIGH OCCUPANCY VEHICLE (HOV) LANES AND IMPROVEMENTS***: The state was interested in using a DB strategy to deliver this project. As a result, the state legislature passed a law, SB 1026, in 2006 allowing Metro to deliver it; according to one interviewee, this decision was due to LA Metro's experience, and Caltrans' relative inexperience, with DB projects. Caltrans will still be responsible for operations and maintenance of the facility after completion. The project has encountered some major delays, particularly related to issues with utility relocation and a large retaining wall, and the completion date has been advanced from May 2013 to mid-2014. Despite this, official sources claim that the project has been shortened by up to 7 years by the use of Design-Build.
>
> ***GOLD LINE EASTSIDE EXTENSION:*** This project, completed in November 2009, was among the first at LA Metro to be delivered under DB. Though most components of the project were bid as DB projects, the construction of the tunnel portion was delivered under the more traditional Design-Bid-Build. The motivation for this mixed method, as explained by one interviewee, was to maintain greater agency control over the tunnel portion, with which LA Metro had little successful experience and which was politically sensitive after safety and construction issues during the construction of the Red Line subway. The project was ultimately delivered on time and budget, thereby providing the impetus to continue pursuing DB for other projects.

4.2 | Funding and Finance

Owing in part to their size and their pursuit of such a large program of projects, as well as the pressing need for reliable transportation and congestion relief, LA Metro has and continues to pilot and advocate for innovative ways to maximize their intake and availability of both funding and financing at many scales: on a project-by-project basis, as well as at the county, state, and federal levels.

PUBLIC-PRIVATE PARTNERSHIPS (PPP): LA Metro is currently examining and experimenting with large-scale PPP projects, which they view as a way of completing projects more quickly and at an earlier date. Following the passage of Measure R, LA Metro initially decided to evaluate three transit and three highway projects for PPP-model application. After consideration, they determined that PPPs would be beneficial to pursue for the three highway projects (a freight corridor along I-710, a tunneling project at the northern terminus of the same corridor, and a new freeway in Northern LA County) but decided that none of the transit projects should move forward as PPPs.

Metro now has a small PPP Program department, consisting of two people. The first application of a PPP strategy will be a bundle of projects called the Accelerated Regional Transportation Improvements, for which a request for proposals will be released in the near future at about $700M. Notably, however, this bundle of projects is not one of the three projects set out in the initially considered program.

Despite Metro's tendency not to deliver highway projects, it will deliver these PPP highway projects due to their intention to either take the toll-revenue risk, such as for truck routes with low volumes, or will provide an availability payment; almost all of the local money for these projects will come from LA Metro. Nevertheless, Caltrans will ultimately become the owner-operator.

> ***ACCELERATED HIGHWAY PROGRAM:*** The goal of this program is to accelerate delivery of highway projects specified in Measure R that aren't fully funded through traditional funding sources. It entails pursuing Public-Private Partnership (PPP) models.

30/10 - AMERICA FAST FORWARD: The 30/10 Plan, described as a goal to deliver 30 years' worth of transit projects in 10 years, advanced at the time of the passage of the 2008 Measure R transportation sales tax. The Plan amounted to 12 key transit projects that serve as a program of projects that receive resource and funding priority. The Plan, whose branding is no longer officially being used at LA Metro, represented a best-case scenario for the development of funding and finance programs at a number of levels of government. America Fast Forward, the federal component of this suite of tools, sought to work with the federal government to increase access to financing for transportation projects through an expansion of the Transportation Infrastructure Finance and Innovation Act (TIFIA), which provides loans to transportation agencies to build transportation projects, and the creation of a Qualified Transportation Improvement Bonds (QTIB) program. Due to the inability to fully attain America Fast Forward's goals in addition to the failure of a new sales tax measure, the timeline for projects formerly included in the 30/10 Plan is closer to 15 years, according to one interviewee. Nevertheless, Metro continues to make particular efforts to identify methods of accelerating these projects.

BONDING AGAINST FUTURE REVENUES: Both the transit and highway accelerated delivery programs mentioned above involve issuing bonds against future sales tax revenue, particularly those raised by Measure R, in order to deliver projects faster. PPP highway projects may additionally involve bonding against future toll revenue in situations where the facilities are tolled.

To further take advantage of this tool, LA County attempted to extend the Measure R tax, which is not slated to sunset until 2039, for another 30 years in order to bond against revenue even further into the future. The initiative placed on the November 2012 ballot, called Measure J, failed to reach the necessary two-thirds vote by half a percentage point.

4.3 | Stakeholder Coordination

INTEGRATED PROJECT MANAGEMENT OFFICE (IPMO): Metro has begun to establish integrated project offices for given projects, which bring designers, engineers, staff and others under one roof without creating a legally separate entity, such as a joint powers or construction authority. This strategy was initially used on the Gold Line Eastside extension and has subsequently been viewed as a successful model to pursue; an IPMO has been created for the forthcoming Crenshaw/LAX Corridor project.

4.4 | Accountability and Oversight

HISTORY: LA Metro (and its predecessor SCRTD) experienced past complications with delivery of transit projects, such as the original Blue and Red lines, which created frustration and tension with local elected officials. One interviewer said that early struggles were particularly related to inexperience, while another indicated that this was in part related to a disagreement over the ability to finish projects with available funds that had been lobbied for by these officials.

As a result, two separate pieces of legislation were passed that created the Blue Line extension (now Gold Line) and Expo Line construction authorities in 1998 and 2003, respectively, thereby taking away control of project delivery from LA Metro. These construction agencies proved to be problematic due initially to their incentive structure, which encouraged speed and cost savings without sufficient controls to encourage construction of quality facilities that were easy to maintain and operate. More recently, LA Metro has worked to create more accountability within the existing construction authorities, which has helped ameliorate these issues. The second phase of the Gold Line Foothill Extension, to Azusa, which continues to be delivered by the Gold Line Foothill Extension Authority, is proceeding on time and on budget, while the final phase of the Expo Line has likewise encountered few issues related to project delivery.

Nevertheless, in part due to the challenges with these construction authorities, LA Metro has been able to use the delivery of the Orange Line Bus Rapid Transit line and the Gold Line Eastside Extension, delivered on-time and on-budget, to demonstrate their abilities and regain regional confidence and support. One interviewee stated that the improvements in the ability to deliver projects that enabled these successes were strongly related to a major institutional restructuring.

OVERSIGHT: The first annual audit requirement and oversight committee for LA Metro were established by the Reform and Accountability Act in 1998, approved by the voters of Los Angeles County, with the stated goal of restoring voter confidence and creating higher accountability in the expenditure of Proposition A and Proposition C sales tax revenues. Subsequently, the Measure R ordinance passed in 2008 required a similar annual audit of LA Metro's compliance with the ordinance and formed an Independent Taxpayer Oversight Committee (ITOC) for Measure R.

LA Metro's Measure R ITOC is composed of three retired state or federal judges, with the Los Angeles County Board of Supervisors, the mayor of Los Angeles, and the Los Angeles County Selection Committee each selecting one. These ITOC members consult with an advisory panel that they have selected, composed of six to twelve members, with one to two members each coming from six areas of expertise relevant to project funding and delivery. Specific responsibilities of the ITOC include creating a report summarizing the annual audit of LA Metro's compliance with the Measure R ordinance, for which the agency itself contracts, and reviewing and making findings regarding ordinance amendments and debt financing.

5 Conclusions

5.1 | Project Delivery Success Factors

CONTRACTUAL ARRANGEMENTS: Various alternative delivery methods exist, such as DB, CMGC, and Design Sequencing, which alter the contractual relationships and roles of those involved in project delivery. Based on these two case studies, it appears that no one such arrangement is guaranteed to produce cost or time savings; SANDAG has seen less success with Design-Build and as such has

decided to pursue a different alternative delivery method, while at LA Metro, according to one interviewee, Design-Build is the preferred method for transit project delivery. SANDAG has nevertheless identified a broadly successful alternative delivery method, design sequencing, and continues to pursue what it sees as its successor, CMGC, which shares some, but not all, of the features of DB. Such outcomes suggest that alternative delivery methods are valid options for a broad array of, though not all, projects. An evaluation process like that of LA Metro potentially provides a good model for selecting project delivery systems, incorporating outside knowledge and experience with regard to the types of projects most suited to alternative project delivery.

STAKEHOLDER COORDINATION: Successes as a result of collaboration, and the related strategy of collocation, can be seen in a number of instances in San Diego and Los Angeles: the positive, intimate relationship between SANDAG and Caltrans; the benefits accrued by SANDAG and Caltrans from early engagement of environmental interests; and the Integrated Project Management Office model at LA Metro. In each case, interviewees identified collaboration as a key aspect of the success of the projects also evidenced by plans to replicate such arrangements in the future.

FUNDING AND FINANCE: Innovative or novel ways of funding and financing projects offer the opportunity to deliver within an increasingly constrained transportation budget scenario. LA Metro in particular provides a number of examples worth noting. New funding and financing sources can be identified at multiple levels: at the federal level with improved and expanded bond and loan programs, at the local level with sales tax revenue extensions that can be bonded against the future, and at the intersection of the public and private sector through public-private partnerships.

ACCOUNTABILITY AND OVERSIGHT: Often critical for success of transportation revenue measures, accountability and oversight mechanisms have also been integrated into transportation sales tax measures and project delivery activities at both SANDAG and LA Metro in order to maintain or increase voter confidence and support for both the agencies and the projects themselves. In both regions, Independent Taxpayer Oversight Committees (ITOCs) were established by sales tax measures to perform vital oversight functions and advise the agencies, and they developed programs of projects slated for acceleration through prioritization and bonding that have aided in legibility of agency goals and voters' ability to identify with projects. SANDAG additionally built a website that provides up-to-date funding and delivery information in graphic and text formats to increase transparency and consequently voter confidence.

INSTITUTIONAL KNOWLEDGE AND EXPERIENCE: Prior experience with types of projects and project delivery methods was identified by numerous interviewees, in differing ways, as critical to successful delivery. In the case of LA Metro, one interviewee contended that its current success with Design-Build was largely a result of agency knowledge and previous experience with letting and managing Design-Build contracts. Furthermore, the individual stated that Design-Build was preferred for types of projects with which LA Metro already had experience, likely with a more traditional, Design-Bid-Build model. In cases where uncertainty existed, expert consultants were sought out.

Interviewees expressed similar sentiments about the San Diego region: experience with design sequencing allowed SANDAG and Caltrans to benefit more consistently from its use. Additionally, an interviewee identified both the use of large consultant contracts and the flexibility of the integrated project team model as an opportunity to reap the benefits of experience indirectly.

6 Appendix

6.1 | List of Interviewees

Bates, Toni – Assistant Vice President/Planning Manager at Parsons Brinckerhoff

Failing, Doug – Executive Director of Highway Programs at LA Metro

Kosup, Allan – I-5 and SR-76 Corridor Director at Caltrans District 11

Murthy, K.N. – Executive Director of Transit Project Delivery at LA Metro

Schneider, Michael – Senior Vice President at Infraconsult

Way, Cecily – Senior Transportation Planner at Parsons Brinckerhoff

6.2 | List of Organizational Acronyms

A.C. Transit – Alameda-Contra Costa Transit District

BART – Bay Area Rapid Transit

Caltrans – California Department of Transportation

HNTB – HNTB Corporation

LACMTA (LA Metro or Metro) – Los Angeles County Metropolitan Transportation Agency

LACTC – Los Angeles County Transportation Commission

LAX – Los Angeles International Airport

MTC – Metropolitan Transportation Commission

NCTD – North County Transportation District

OCTA – Orange County Transportation Authority

PBS&J – Currently 'Atkins'

SACOG – Sacramento Council of Governments

SANDAG – San Diego Association of Governments

SCAG – Southern California Association of Governments

SCRTD – Southern California Regional Transit District

SDMTS – San Diego Metropolitan Transit

SFCTA – San Francisco County Transportation Authority

SFMTA – San Francisco Metropolitan Transportation Agency

SRT – Sacramento Regional Transit District

STA – Sacramento Transportation Authority

Table 1 Key California County and Regional Transportation Agencies

REGION	ORGANIZATION	SALES TAX AUTHORITY	TRANSIT PROJECT DELIVERY	HIGHWAY PROJECT DELIVERY	CONGESTION MANAGEMENT AGENCY	TRANSIT OPERATOR	METROPOLITAN PLANNING ORGANIZATION	REGIONAL TRANSPORTATION PLANNING AGENCY
San Diego	SANDAG	✔	✔	(✔)[10]	✔		✔	✔
	SDMTS					✔		
	NCTD					✔		
Los Angeles	LACMTA	✔	✔	✔[11]	✔	✔		✔
	SCAG						✔	
Orange County	OCTA	✔	✔	(✔)[1]	✔	✔		✔
	SCAG						✔	
Sacramento	SACOG			*	✔		✔	✔
	SRT		✔	*		✔		
	STA	✔		*				
San Francisco	MTC						✔	
	SFCTA	✔	✔[2]	✔[2]	✔			✔
	SFMTA		✔[2]			✔		

Note: Those marked by an * indicate that highway projects are delivered by Caltrans

Sources: Sandag.org, Gonctd.com, SDMTS.com, Metro.net, Dot.ca.gov, OCTA.net, SacTA.org, SacRT.com, SACOG.org, SFCTA.org, SFMTA.com, MTC.ca.gov.

Table 2 Current Sales Tax Measures

ORGANIZATION	NAME	VALUE	APPROVED/TOOK EFFECT	DURATION	PERCENT APPROVAL	PROJECTED REVENUES	REVENUE FUND[12]	TRANSIT OPERATING AND MAINTENANCE COSTS
LACMTA	Measure R	½ ¢	2008/July 2009	30 yr	68%	$40 B	Sales Tax Revenue Fund with Subfunds	Yes (Subfund)
OCTA	Measure M2	½ ¢	2006/April 2011[13]	30 yr	70%	$15.5 B	Transportation Special Revenue Fund	No
SANDAG	Transnet	½ ¢	2004/April 2008[2]	40 yr	>67%	$14 B	No	Yes
STA	Measure A	½ ¢	2004/April 2009[2]	30 yr	>75%	$4.74 B	No	Yes[14]

Sources: Metro.net, Sandag.org, OCTA.net, Sacta.org.

[10] Delivered by Caltrans with significant input or control from specified agency
[11] Delivers a portion of these types of projects, e.g. more recent special projects involve P3s or design-build (by legislative authority)
[12] A special revenue fund is an account whose contents must be used for a specific purpose; this is intended to provide an extra level of accountability and transparency.
[13] Time gaps between approval and effect date are to avoid overlap with existing transportation sales taxes.
[14] Most transit funding will be allocated to operations and maintenance.

Table 3 Oversight and Review

ORGANIZATION	OVERSIGHT COMMITTEE	ANNUAL AUDIT	COMPREHENSIVE PROGRAM REVIEW
LACMTA	3 retired judges; judge-selected advisory panel from each area of expertise	Yes	No
OCTA	11 geographically distributed members	Yes	10-year cycle
SANDAG	7 members, one from each area of expertise + 2 ex-officio members	Yes, including of local agencies	10-year cycle
STA	3 members, one from each area of expertise + 3 ex-officio members	Yes	No

Sources: Metro.net, Sandag.org, OCTA.net, Sacta.org.

Table 4 Additional Information

ORGANIZATION	NEW EXACTION FEE	PROJECT ACCELERATION PROGRAM	SIGNATURE/HIGH PROFILE PROJECTS
LACMTA	No	30/10 America Fast Forward (Bonding)	Orange Line Extension Subway Extension* Gold Line Extension* Expo Line Extension*
OCTA	No	Early Action Plan (Bonding) M2020 Plan	I-405 Widening*
SANDAG	$2,000 per new housing unit, increased annually	Early Action Program (Bonding)	Mid-Coast Trolley*
STA	$1,000 per new single family home, proportional fee for other development based on trip generation rate	No	Capital Southeast Connector* Green Line Extension(*)

Note: Those marked by an * are in progress or yet to be completed.

Sources: Metro.net, NBC Los Angeles, Sandag.org, OCTA.net, U-T San Diego, Sacta.org, The Transport Politic, Sacramento Bee, Sacramento Business Journal.

Table 5 Previous Transportation Sales Taxes

ORGANIZATION	NAME	VALUE	APPROVED/TOOK EFFECT	DURATION	REVENUES TO DATE	SIGNATURE/HIGH PROFILE PROJECTS
LACMTA	Prop A Prop C	½ ¢ ½ ¢	1980 1990	Permanent Permanent	$694 M/year $694 M/year	Metro Blue, Red, and Green Lines; Century Freeway Corridor
OCTA	Measure M1	½ ¢	1991	20 years	$4 B	I-5/I-405 Interchange (M1)
SANDAG	Transnet	½ ¢	1988	20 years	$3.3 B	I-15 Express Lanes
STA	Measure A	½ ¢	1989	20 years	Unavailable	N/A

Sources: Metro.net, Sandag.org, Orange County Register.

Table 6 Transit Operating Fund Allocations for Transportation Sales Tax Measures

COUNTY	NAME (YEAR PASSED)	TRANSIT OPERATIONS ALLOCATIONS	NOTES
Los Angeles	Measure R (2008)	20% to Bus Operations 5% to New Rail Operations	Inclusion of Bus Operations Fund related to political context and pressure from the Bus Riders' Union
San Diego	Prop A 'Transnet' (2004)	7.9% of Total to Specified Project Operations 16% of Total to General Transit Operations[15]	Transit operators whose total operating cost per vehicle hour exceeds that of the previous year, adjusted for inflation, are ineligible for general transit operations funds in excess of the previous year's levels
Alameda	Measure B (2000)	21.91% to General Transit Operations	Funds are allocated in percentages to specific operators and, in the case of A.C. Transit, sub-regions within jurisdictions of single operators
Santa Clara	Measure A (2000)	18.5% to Expanded Service Operations (Specified Projects)	Eligible expanded services are specific light rail lines, commuter rail connection to BART, expanded paratransit services, expanded bus fleet of 750 vehicles, and BART extension to San Jose[16]
San Mateo	Measure A (2004)	Included in Capital Project Allocations	The division between capital and operations spending is not specified for projects whose funds are also eligible for operations, with the exception of Caltrain, which has an operations cap of 50%[17]

Sources: Metro.net, TheStrategyCenter.org, Sandag.org, ACTC.org, SMCTA.com, VTA.org.

[15] Less 2.5% for paratransit, 3.25% for senior transportation grant program for non-profits, and funds sufficient to support reduced price passes for youth/seniors
[16] Auditors in 2008 noted that the breakdown of funds and the meaning of 'expanded service'. The VTA does not specify exact projects receiving Measure A Operating Assistance funds in their budget.
[17] Eligibility of Caltrain funding for operations was not part of the original 1988 ordinance

Appendix J

SUMMARY OF PLAN PERFORMANCE

This appendix provides a brief summary of additional performance measures used to compare the performance of the SFTP Investment Plan and Investment Vision. Performance measures are organized according to the four SFTP goal areas – World Class Infrastructure, Healthy Environment, Livability, and Economic Competitiveness. Transportation system performance measures are drawn primarily from the SFCTA's travel demand model (SF-CHAMP) comparisons of a future with and without plan investments. Performance on other measures tiers off the level of funding provided in the SF Investment Plan and Investment Vision.

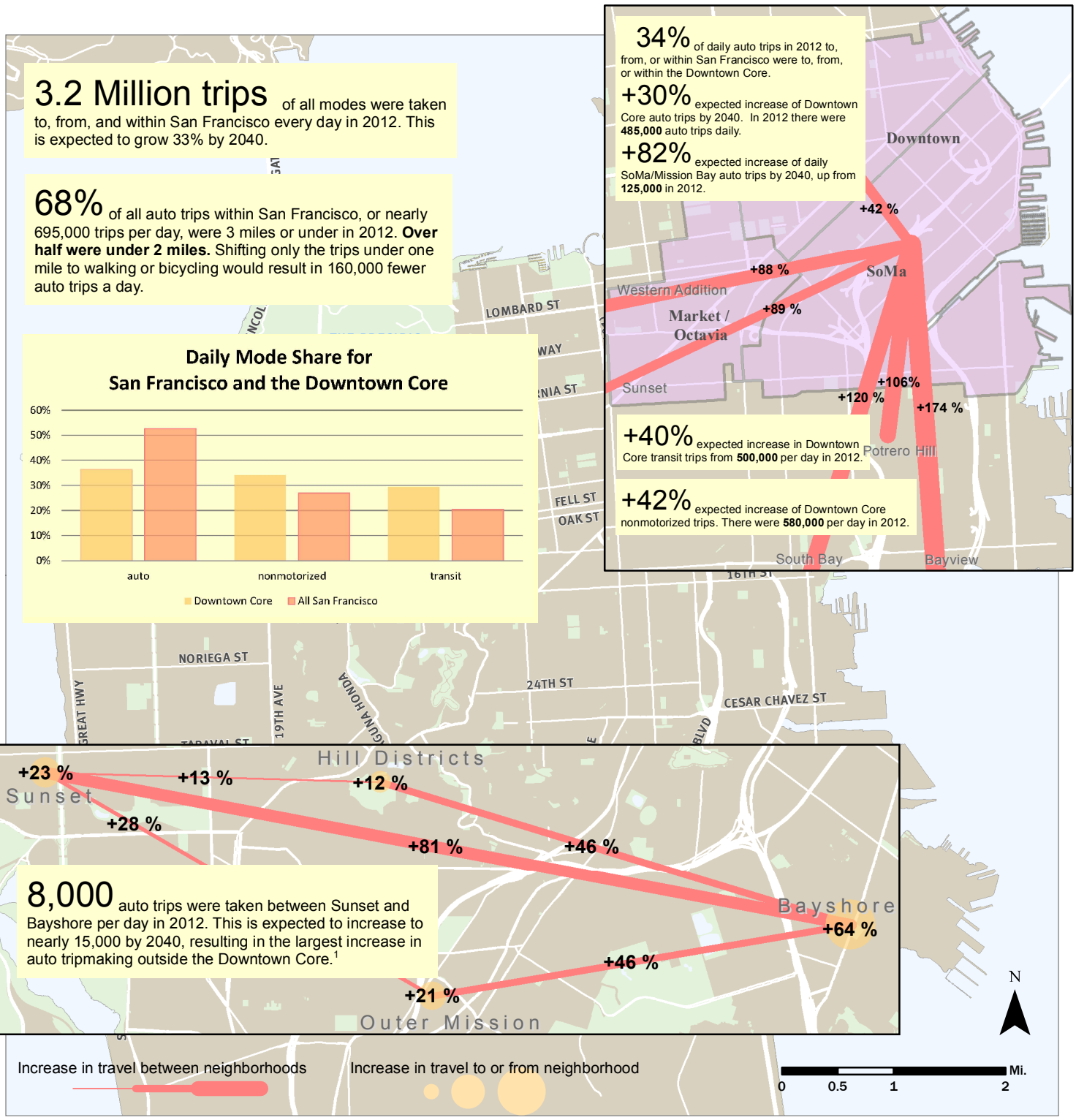
Table 1. Investment Plan and Investment Vision Performance

	Investment Plan	Investment Vision
World Class Infrastructure		
% Increase in operating funding over today's levels	About a 1% increase over today's operating funding	About 4.5% increase over today's operating funding
% of muni and regional operator Vehicle Maintenance and Replacement Needs Met	100%	100%
% of Muni and regional operator Highest Priority Capital Asset Maintenance and Replacement Needs Met	70%	100%
Average frequency on most crowded transit lines	-frequency increase on 10 most crowded lines: 7 buses per hour, up from 5 in the baseline (45% increase) -Frequency increase on lines with any crowding: 7 buses per hour, up from ~5.5 per hour in baseline (26% increase)	-frequency increase on 10 most crowded lines: 8 buses per hour, a 68% increase -frequency increase on lines with any crowding: ~8.5 buses per hour (up 47% from baseline)
Pavement Condition Index	64	70
Change in crowding on most crowded lines	Down 19% (10 most crowded lines, down from 78% crowded to 58% crowded) Crowded=Share of person hours traveled in conditions that are greater than 85 percent full on transit vehicles. *Note: Does not account for potential additional ridership generated by transportation demand management strategies.*	Down 38% (same group, down to 45% crowded) *Note: Does not account for potential additional ridership generated by transportation demand management programs.*
High value projects (Projects that emphasize reliability improvement)	MUNI Transit Effectiveness Project (lower-cost travel time and reliability improvements focused on the bus system) Partial funding for Muni and regional operator Transit Performance Initiative (higher cost reliability improvements focused on removing rail bottlenecks) + partial funding for expanded system of dedicated busways Projects to improve reliability by creating dedicated busways (Bus Rapid Transit Projects on Geary, Geneva, Bayshore/Portrero) M-Line West Side Alignment and Grade Separation (environmental phase only)	All Investment Plan projects plus full funding of M-line and more funding for Transit Performance Initiative and funding for expanded system of dedicated transit busways
Environment		
% increase in funding for cost-effective travel demand management strategies	20%	200%
Greenhouse gas reduced (overall)	9-12% reduction (from future baseline)	10-15% reduction (from future baseline)
Automobile trips reduced	Down 6-10% vs. baseline (over half of reduction explained by congestion pricing)	Down 7-14% vs. baseline
High value projects funded (Projects that result in significant reduction in drive-alone trips)	Congestion pricing and related multi-modal investments in downtown and Treasure Island	Same as Investment Plan
Livability		

Additional pedestrian amenities	Funds 40% of the Mayor's Pedestrian Strategy, nearly 20 miles of safety upgrades	Funds 100% of the Mayor's Pedestrian Strategy, including over 40 miles of safety upgrades, as well as an additional 40 miles of streetscape enhancements
Pedestrian collision rates	At least a 4 percent reduction due to auto trips alone (relative to future NP), plus additional benefits from the Mayor's Pedestrian Strategy investment benefits. The Mayor's pedestrian strategy focuses on 70 miles of streets that account for 60 percent of pedestrian injuries. If we eliminated all injuries on those streets, ped collisions could be reduced by more than half.	At least a 10 percent reduction due to decline in auto trips alone, plus additional benefits from the Mayor's Pedestrian Strategy investment benefits. The Mayor's pedestrian strategy focuses on 70 miles of streets that account for 60 percent of pedestrian injuries. If we eliminated all injuries on those streets, ped collisions could be reduced by more than half.
Share of all trips made by walking, cycling, and transit	51-54% (up from 48% in baseline; 54% of effect attributed to congestion pricing)	51-56%
Additional transit trips	6-10% more than baseline (72% of change attributed to congestion pricing)	9-17% more than baseline
Additional bicycling and walking trips	3-8% more than baseline	3-10% more than baseline
New miles of protected transitways	~15 project miles	~33 project miles
High value projects (High-cost projects to improve pedestrian and bicycle infrastructure) –note many lower cost projects are funded through programs)	Better Market Street Project - Re-design and improve Market Street for transit, bicycling, and pedestrians between Stuart Street and Octavia Boulevard. 22% of Bicycle Strategy	Everything in the Investment Plan, plus 100% funding of the Bicycle Strategy, including citywide bicycle sharing and parking.
Economic Competitiveness		
Speeds – transit	14 % improvement in MUNI speeds on rapid network 9% improvement in Muni speeds systemwide	18% improvement in MUNI speeds on rapid network 14% improvement in MUNI speeds systemwide
High value projects to serve regional commute connections and provide new transit services	High occupancy vehicle lanes on I-280 from US 101 to 6th street Caltrain Oakdale Station T-third Street light rail extension to Caltrain Bayshore Station Express bus services from candlestick and hunter's point to downtown Waterfront capacity and performance improvements, including historic streetcar services	(includes all those in the Investment Plan AND the following): High occupancy vehicle lanes on US 101 from the County Line to I-280 Partial funding for the BART Metro Project, which would allow BART to run more frequent transbay service to the core of San Francisco. Five new regional commuter bus lines operating at 12 minute headways during peak periods

Appendix K

SF TRAVEL AT A GLANCE


3.2 Million trips of all modes were taken to, from, and within San Francisco every day in 2012. This is expected to grow 33% by 2040.
68% of all auto trips within San Francisco, or nearly 695,000 trips per day, were 3 miles or under in 2012. Over half were under 2 miles. Shifting only the trips under one mile to walking or bicycling would result in 160,000 fewer auto trips a day.
Daily Mode Share for San Francisco and the Downtown Core
60%
50%
40%
30%
20%
10%
0%
auto
nonmotorized
transit
Downtown Core
All San Francisco
34% of daily auto trips in 2012 to, from, or within San Francisco were to, from, or within the Downtown Core.
+30% expected increase of Downtown Core auto trips by 2040. In 2012 there were 485,000 auto trips daily.
+82% expected increase of daily SoMa/Mission Bay auto trips by 2040, up from 125,000 in 2012.
Downtown
+42 %
+88 %
SoMa
Western Addition
Market / Octavia
+89 %
Sunset
+106%
+120 %
+174 %
+40% expected increase in Downtown Core transit trips from 500,000 per day in 2012.
Potrero Hill
+42% expected increase of Downtown Core nonmotorized trips. There were 580,000 per day in 2012.
South Bay
Bayview
LOMBARD ST
FELL ST
OAK ST
NORIEGA ST
24TH ST
CESAR CHAVEZ ST
GREAT HWY
19TH AVE
Hill Districts
+23 %
Sunset
+13 %
+12 %
+28 %
+81 %
+46 %
8,000 auto trips were taken between Sunset and Bayshore per day in 2012. This is expected to increase to nearly 15,000 by 2040, resulting in the largest increase in auto tripmaking outside the Downtown Core.[1]
Bayshore
+64 %
+46 %
+21 %
Outer Mission
N
Increase in travel between neighborhoods
Increase in travel to or from neighborhood
Mi.
0
0.5
1
2

San Francisco at a Glance: Daily Tripmaking to, from, and within San Francisco Now and 2040

Three key travel trends that shaped the SFTP

Of the 3.2 million trips to, from, or within San Francisco every day, 53% are taken by private automobile. Growth is expected to put exceptional stress on the surface transportation network in coming years, particularly in the Downtown/SoMa Core, the US 101 Corridor, and the Eastern Neigborhoods. Over two-thirds of trips entirely within San Francisco are under three miles in length, and represent an opportunity to shift to non-motorized modes walking and bicycling.

[1]Refers to travel between neighborhoods.

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Sources: Citywide trip and mode statistics come from the 2010 California Household Travel Survey. Neighborhood level trip and mode share, and projections for 2040 are from SF-CHAMP.

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